

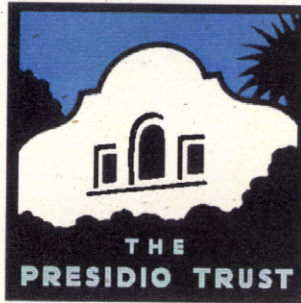


**DRAFT
SMALL ARMS FIRING RANGES
REMEDIAL INVESTIGATION REPORT
PRESIDIO OF SAN FRANCISCO, CALIFORNIA**

Prepared For:

**The Presidio Trust
34 Graham Street, P.O. Box 29052
San Francisco, California 94129-0052
415/561-5300 fax 415/561-5315**

February 2004



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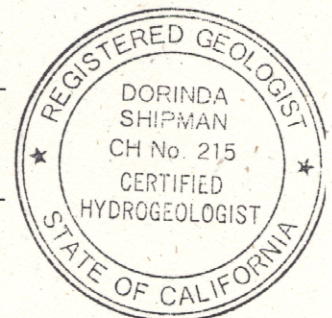
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3 February 2004

Date



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SMALL ARMS FIRING RANGES
REMEDIAL INVESTIGATION REPORT

List of Acronyms and Abbreviations

Army	U.S. Army
Army Corps	U.S. Army Corps of Engineers
ARARs	Applicable or Relevant and Appropriate Requirements
AST	Above ground storage tank
ASTM	American Society for Testing Materials
BAPR	Barnard Avenue Protected Range
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CHP	California Highway Patrol Pistol Range
Cleanup Levels Document	<i>Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water</i>
COCs	Contaminants of Concern
DPT	direct-push technology
DQOs	Data quality objectives
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
FSP	Field Sampling Plan
GGBHTD	Golden Gate Bridge Highway and Transportation District
GGNRA	Golden Gate National Recreation Area
GMPA	General Management Plan Amendment
GPS	Global Positioning System
ICP/MS	Inductively Coupled Plasma/Mass Spectrometry
LCPR	Lobos Creek Protected Range
LCTB	Lobos Creek Target Butt
Main Installation FS	<i>Presidio Trust Revised Feasibility Study Report Main Installation Sites</i>

List of Acronyms and Abbreviations

(continued)

MGB	Machine Gun Butt
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MOA	Memorandum of Agreement
µg/L	micrograms per liter
NAD	North American Datum
MS/MSD	matrix spike/matrix spike duplicate
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPS	National Park Service
PCOCs	Potential Contaminants of Concern
PLLW	Presidio Lower Low Water
Presidio	The Presidio of San Francisco, California
PRGs	preliminary remediation goals
QA/QC	Quality Assurance/Quality Control
QAPP	<i>Presidio-wide Quality Assurance Project Plan and Sampling and Analysis Plan</i>
RAOs	Remedial Action Objectives
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RWQCB	Regional Water Quality Control Board
RPDs	relative percent difference
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SOP	Standard Operating Procedure
STLC	Soluble Threshold Limit Concentration
TCLP	Toxicity Characteristic Leaching Potential
Trust	The Presidio Trust
Trust Act	Omnibus Parks and Public Lands Management Act of 1996

List of Acronyms and Abbreviations
(continued)

TTLC	Total Threshold Limit Concentration
WET	California Waste Extraction Test
Work Plan	<i>Work Plan for the Small Arms Firing Ranges Remedial Investigation/Feasibility Study</i>
XRF	X-ray fluorescence

1.0 INTRODUCTION

On behalf of The Presidio Trust (Trust), Treadwell & Rollo, Inc. has prepared this *Draft Small Arms Firing Ranges Remedial Investigation (RI) Report*. The purpose of the RI report is to present results that define the nature and extent of contamination at five historical small arms firing ranges at The Presidio of San Francisco, California (Presidio) as required by the California Department of Toxic Substances Control (DTSC). The five small arms firing ranges (Figure 1) that were investigated under this RI are:

- Lobos Creek Target Butt (LCTB),
- Lobos Creek Protected Range (LCPR),
- Machine Gun Butt (MGB),
- California Highway Patrol Pistol Range (CHP), and
- Barnard Avenue Protected Range (BAPR).

The Presidio is located in the City of San Francisco, at the northern tip of the San Francisco peninsula (Figure 1). The Presidio occupies approximately 1,491 acres and is bounded by San Francisco Bay on the north and the Pacific Ocean on the west. Densely populated residential areas of San Francisco border the Presidio to the south and east.

The Presidio was a U.S. Army (Army) installation from 1848 through 1994, serving as a mobilization and embarkation point during several overseas conflicts, a medical debarkation center, and a coastal defense for the San Francisco Bay area. Industrial operations formerly performed at the Presidio are associated with maintenance and repair of vehicles, aircraft, and base facilities. The Presidio also contains a number of landfills used by the Army for the disposal of municipal waste and construction debris.

In December 1988, the Secretary of Defense's Commission on Base Realignments and Closures recommended closure of the Presidio. Under Public Law 92-589, the Presidio was transferred to the National Park Service (NPS) on 1 October 1994 and became part of the Golden Gate National Recreational Area (GGNRA). As required by the Base Realignment and Closure Act, the Army initiated environmental studies in conjunction with the transfer of the property.

Section 103 of the Omnibus Parks and Public Lands Management Act of 1996, Public Law 104-333, 110 Stat 4097 (Trust Act) created the Trust. The Trust is a federal government corporation established for the purpose of managing the leasing, maintenance, rehabilitation, and improvement of Area B (the non-coastal portions of the Presidio) in accordance with the general objectives of the approved General Management Plan Amendment (GMPA) (NPS, 1994). The NPS retained responsibility for Area A of the Presidio (the coastal portions of the Presidio).

On 24 May 1999 the Army, the Trust, and NPS entered into a Memorandum of Agreement (MOA). Pursuant to this MOA, the Army delegated to the Trust its authority for the remediation of contamination at the Presidio (both Areas A and B).

These five small arms firing range sites collectively form Operable Unit 3 at the Presidio (DTSC 1999). The Trust, as described below and in Table 1, determined that five small arms firing ranges (LCTB, LCPR, MGB, CHP, BAPR) warranted further characterization beyond the Site Investigations (SI) stage conducted for the Army by Montgomery Watson. The RI was conducted in accordance with applicable U.S. Environmental Protection Agency (EPA) and DTSC guidance, specifically, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final October 1988* (EPA, 1988).

1.1 Purpose

The purpose of the RI is to characterize the nature and extent of contamination at the five small arms firing ranges. The RI was performed in accordance with the approved *Work Plan for the Small Arms Firing Ranges Remedial Investigation/Feasibility Study* (Work Plan) (Treadwell & Rollo, 2002). Following completion and approval of the RI, Treadwell & Rollo will assist the Trust in developing a Feasibility Study (FS) to develop and evaluate appropriate remedial alternatives to permanently address the risks which may be posed by the sites. The objective of the RI/FS process is not to remove all uncertainty about a site's characteristics and risk, but rather to gather sufficient information to support an informed management decision regarding which remedy would be the most appropriate for a site (EPA, 1988).

The RI/FS process represents the decision-making procedures to be followed for implementation of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 (commonly known as Superfund) as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR Part 300) outlines the specific steps to be followed in making remedy selection decisions for a site (EPA, 1990). In conducting this RI/FS, the Trust will follow the NCP, and applicable DTSC regulations for the evaluation and selection of remedial alternatives for the small arms firing range sites and will solicit regulatory agency and Restoration Advisory Board comments.

Following the completion of the RI/FS, the sites will undergo the Remedial Action Plan (RAP) process to document the selection of the remedial action alternatives for the small arms firing range sites, in accordance with the State of California, DTSC Guidance Document No. EO-95-007-PP, RAP Policy (DTSC, 1995). In accordance with the DTSC guidance, the RAP will be subject to formal public review and comment.

1.2 Site Background

Between the 1800s and the early to mid-1900s the Army used several small arms firing ranges throughout the Presidio (Montgomery Watson, 1997). Small arms firing ranges are generally used for controlled firing of pistols, rifles, and shotguns. Targets vary from stationary silhouettes to rapidly moving targets such as skeet. Small arms firing ranges are associated with recreational shooting facilities, law enforcement agencies, and with the training of military personnel (Edmunds, 1993). Generally, the length of the firing line to the target butt or backstop varies between 100 to 300 feet. Depending on the size of the ammunition and the angle of fire held by the rifle or gun, it is possible that spent shot can travel as far as approximately 198 yards to 330 yards (Baldwin, 2001). Generally lead concentrations decrease with increasing distance away from the target berm (Edmunds, 1993). Surveys at other small arms firing ranges have indicated metal contamination to be as high as 23,200 milligrams per kilogram (mg/kg) for lead, 1,620 mg/kg for copper, and 290 mg/kg for zinc (Montgomery Watson, 1997).

At the Presidio, small arms firing ranges were specifically used by the Army for the training of military personnel. Presidio outdoor firing ranges were generally constructed with a target stop, target butt or impact berm to capture fired rounds of ammunition behind the target. Natural dune deposits or hillside slopes were often used as impact berms or butts. After the backstop or berm became saturated with spent ammunition, remaining bullets fragmented or shattered upon impact. Additionally, some ammunition projectiles traveled past the target berm until they impacted a horizontal fall area.

Montgomery Watson completed the *Site Investigation for the Small Arms Firing Ranges at the Presidio* for the Army in July 1997. The scope of the SI included sampling at eight former small arms firing ranges within the Presidio and analyzing for five Contaminants of Concern (COCs): antimony, barium, copper, lead, and zinc. Sampling consisted of shallow excavations to discrete depths of 0.3, 1.0, 2.0, 3.0, and 4.0 feet below ground surface (bgs) using hand augers and trowels (Montgomery Watson, 1997). Samples were field analyzed for antimony, barium, copper, lead, and zinc using energy dispersive X-ray fluorescence (XRF). The XRF uses an electron beam to excite the electrons in the sample. The excited electrons emit X-rays characteristic to specific elements. These X-rays are then measured to provide a result (Schneider et al, 1995). XRF results were used as a screening tool to assess whether additional sampling was required to define the vertical and horizontal extent of the contamination. To confirm high concentrations of XRF results for lead and barium at each site, 20 percent of the samples were reportedly sent to a fixed laboratory for analysis by EPA Method 6010 (Montgomery Watson, 1997). SI sample locations at LCTB, LCPR, MGB, and CHP are illustrated on Figures 2 through 5. To collect spent ammunition from the sample locations, the sample was passed through an American Society for Testing Materials (ASTM) Sieve #4 at all locations where ammunition was observed. At each site, collected bullets were logged and identified as ammunition artifacts for archeological research purposes. Following the field analysis of each firing range, sites were screened to determine if more investigations were

warranted. Lead was considered the primary COC because antimony, barium, copper, and zinc were detected at concentrations below the existing screening criteria.

Table 2 presents a historical activities summary for the five small arms firing ranges included in this RI. Appendix A presents a summary of the historical SI results. Previous Presidio-wide studies have presented detailed background and physical characteristics information on the Presidio including the Army's RI (Dames & Moore, 1997) and the *Presidio Trust Revised Feasibility Study Report Main Installation Sites* (Main Installation FS) (EKI, 2003). The background information presented in this RI report is focused on the five small arms firing ranges and the affected soil media. A brief summary of the history and physical characteristics of each of the five historical firing ranges included in this RI is presented below.

1.2.1 Lobos Creek Target Butt

The LCTB was located south of former Building 1788 in the Lobos Creek Area (Figure 1). Lobos Creek is located approximately 75 feet west of the target butt (Figure 2). The LCTB was used from approximately 1896 to 1902 (Army Corps, 2003). Maps indicate the historical footprint of the LCTB to be 270 feet long by 20 feet wide. Shooting is presumed to have been from east to west. The LCTB appears as a sandy rise east of the pumphouse (Building 1786) approximately 255 feet long, 56 feet wide, and 4 feet high, with a 300-foot firing line. The rise is densely covered by grasses, trees, and small brush but no sensitive vegetation exists at the LCTB (NPS, 2001a). The lithology of the LCTB is comprised of beach/dune sand (Schlocker, 1974). The entire Lobos Creek Area is designated as an archeologically sensitive area (NPS, 2001b).

1.2.2 Lobos Creek Protected Range

The LCPR was located north of Lake Street and east of the LCTB (Figure 1). The LCPR was used from approximately 1902 to 1910 (Army Corps, 2003 and Montgomery Watson, 1997). Historical maps depict the LCPR as an elongated strip running northwest to southeast approximately 900 feet long by 30 feet wide (Montgomery Watson, 1996). An asphalt parking and garage area associated with the construction of Buildings 1750, 1752, 1753, and 1754 now overlies the historical footprint (Figure 3). Native lithology at the LCPR is beach/dune sands (Schlocker, 1974). As mentioned in Section 1.2.1 above, the Lobos Creek Area is designated as an archeologically sensitive area, although such features have not been identified within the LCPR (Montgomery Watson, 1997). Past excavations have occurred at this site as part of dune reconstruction and revegetation activities (NPS, 1998).

During the 1997 SI, LCPR was sampled in two phases because it was not clear whether the elongated strip identified on historic maps was at one time the firing range, firing line, or the backstop (Montgomery Watson, 1997). As a result, the hillside along the northwest edge of the LCPR and the adjacent hillside to the east were sampled. At the conclusion of the field

sampling, no determination was made as to which hillside was used as the backstop. A 1907 map presented in the recently completed Archive Search Report (Army Corps, 2003) indicates that a target butt was located at the northern end of the elongated strip, although it is possible that firing also occurred into the eastern hillside.

Since the 1997 SI, sections of the LCPR (the main dunes) were restored and planted with native plants (NPS, 1998). The first stage included removing debris and the burial of powerlines that formerly traversed the site above ground. Approximately 48 Monterey pines were removed from Old Howard Road and sand was placed and contoured into small hummocks to diversify the topography. This material was then used as fill for the Richmond Transport Project. Sand generated from the Richmond Transport Project trenching was used in recontouring the natural dune topography of the site (Figure 3). In December 1995, a sewer pipe break and sink hole at a nearby former residence, 125 El Camino Del Mar, provided additional sand needed for recontouring the land. A total of approximately 8,000 cubic yards of sand was brought in to assist in recontouring and revegetating the dunes. From 1995 to 1998, approximately 80,000 plants were planted from seedlings. Currently, an interpretive boardwalk runs along the path of Old Howard Road and connects to Lincoln Boulevard. As a result of the restoration, a large area of the LCPR has been designated an ecologically sensitive area (Figure 3). Specifically, the San Francisco Lessingia, Spineflower, Wallflower, and Dune Gilia are present at LCPR and are considered to be special status plants in the State of California (NPS, 2001a).

1.2.3 Machine Gun Butt

MGB is located in Crissy Field south of former Building 637 (Figure 1). The MGB was used during the late 1930s and early 1940s (Montgomery Watson, 1996). Historically, the MGB was designated as Structure 635 and encompassed an area of approximately 50 feet by 50 feet (Figure 4). The bedrock slope may have served as a backstop (Montgomery Watson, 1997). A motor pool area was constructed at the site following its use as a firing range. The motor pool area included several above ground storage tanks (ASTs). In 1993, the ASTs and associated piping were removed, and soil impacted with petroleum was excavated from the site. Approximately 736 cubic yards of soil were hauled off-site and disposed at the BFI and Forward landfills as Class II and Class III wastes, respectively (Ramos Engineering, 1993). Soil to approximately 18 inches bgs was removed from beneath the ASTs and pump islands (EKI, 1999). Based on the confirmation sampling conducted by the Army, petroleum hydrocarbons and related constituents appear to have been removed from the soil to below applicable cleanup levels (EKI, 1999). In 1999, the Building 637 Area underwent a removal action to address contaminated groundwater and soil. Removal activities included excavation of contaminated vadose zone soil from the site, treatment of residual hydrocarbons in the smear zone, and establishing a monitoring well network to monitor contaminated groundwater (EKI, 2000). Sampling activities associated with the tank removals at the MGB did not include metal analyses. Samples were only tested for petroleum hydrocarbons and related constituents.

Currently, the MGB is void of ASTs and is paved with asphalt in front of the hillside (Figure 4). A 6-foot high chain link fence runs the length of the site and the hillside is densely vegetated with poison oak, blackberry bushes, and ivy. There are areas with sensitive vegetation species adjacent to the MGB (Figure 4) (NPS, 2001a). The lithology of the MGB is Franciscan Formation (serpentinite) and beach/dune sand (Schlocker, 1974). However, Colma lithology was also observed during the RI sampling.

1.2.4 California Highway Patrol Pistol Range

The CHP is located in the northern part of the Presidio near the Golden Gate Visitor Center and toll booths (Figure 1). The CHP was used from 1944 until 1964 and was approximately 50 feet wide by 60 feet long (Army Corps, 2003 and Montgomery Watson, 1997). The CHP is located in an archeologically sensitive area within the Battery East, north of a scenic viewing area and parking lot (Figure 5). The Battery East was constructed in 1876 and is part of the Presidio National Historic Landmark District. A sidewall of the gun battery is beneath the subsurface and is similar to an ammunition bunker. This portion of the gun battery served as the backstop when the firing range was operational (Montgomery Watson, 1997). The CHP firing line was constructed on concrete and presently the area in front of the firing line and targets is paved with asphalt. No samples were taken during the SI from beneath the asphalt or concrete. The backstop is 10 feet high and is covered by dense vegetation. The entire battery and earthworks of the CHP is considered to be an archeologically sensitive structure (NPS, 2001b). Native lithology at the CHP is Franciscan Formation (serpentinite) (Schlocker, 1974). However, collected RI soil samples were representative of beach/dune sand and Colma lithologies.

1.2.5 Barnard Avenue Protected Range

The BAPR is located in a canyon east of Barnard Avenue, and Building 42 (Figure 1). A portion of the range is overlain by Landfill E (Figure 6). According to historical maps of the Presidio, the range first appeared in approximately 1907 (Army Corps, 2003) and was not present after 1934, although the exact years of use are not known. It appears to have had four target butts, the furthest one extending out approximately 1,000 feet (Historical Map, 1909). Prior to disposal operations at Landfill E, the area was a ravine, and wastes were dumped into the ravine (Montgomery Watson, 1999). In 1946, landfilling operations began and continued until approximately 1973 (Montgomery Watson, 1999). The native lithology of the BAPR is Colma Formation (Dames & Moore, 1997). However, beach/dune sand was also observed in collected RI soil samples. Currently, the canyon is heavily vegetated with low brush plants such as blackberry bushes and trees. There is a sensitive habitat located on the west side of the northern portion of BAPR (NPS, 2001a). Two groundwater seeps are located on the northern portion of the site (EKI, 1998). Also, the Pop Hicks ballfield, a baseball diamond, was constructed in the mid-1950s, and is located on the southern portion of Landfill E (Figure 6).

1.3 Report Organization

This report is organized as follows.

- Section 1.0 describes the Presidio location, historical site activities, and describes the five physical features of the five firing ranges;
- Section 2.0 describes the remedial investigation program, sampling and analysis approach including data quality objectives, needs, and indicators, field mobilization tasks, sampling results, and the data quality summary;
- Section 3.0 describes the nature and extent of contamination at the five firing ranges;
- Section 4.0 describes the potential routes of contaminant migration and contaminant persistence;
- Section 5.0 discusses site summary conclusions and which sites may warrant further investigation;
- Appendix A discusses and presents historical SI sampling results;
- Appendix B contains boring logs;
- Appendix C contains laboratory analytical reports. Appendix C is included in electronic form on a compact disk CD; and
- Appendix D contains the laboratory analytical quality control (QC) reports prepared by Data Val Inc. (DataVal), the project data validation firm.

2.0 REMEDIAL INVESTIGATION APPROACH

The purpose of this RI was to collect and analyze soil samples for COCs to further characterize the nature and extent of contamination at the five small arms firing ranges. The RI goal of delineating the nature and extent of contamination at each small arms firing range and gathering adequate data for selection of a remedial action was accomplished using the rationale presented in the Work Plan and below in Section 2.2. The field investigation approach built on the SI results, specifically on the results that exceeded the screening, threshold, and cleanup levels, as presented in Appendix A. Data gaps were assessed and identified, and a proposed sampling location, frequency, and analysis plan was developed (Treadwell & Rollo, 2003).

2.1 Sampling and Analysis Approach

The sampling and analysis approach was developed in accordance with the *Presidio-wide Quality Assurance Project Plan and Sampling and Analysis Plan* (QAPP) (Tetra Tech, 2001). The QAPP serves as the reference document for all environmental investigation and remediation work performed at the Presidio. The QAPP specifies the general quality assurance/quality control (QA/QC) procedures to be followed. A project-specific Field Sampling Plan (FSP) was prepared based on the QAPP guidelines and is presented in the Work Plan. The project-specific DQOs, data types and uses, data quality needs, levels of concern, and data quality indicators are presented in the sections below.

Based on a review of historical results, contamination from spent ammunition was distributed at the ground surface or within a few feet into the impact berms. The associated COCs are relatively immobile at typical pH values found in surface and near-surface soil. Therefore, shallow soil was the only medium sampled as part of the RI, along with source water and equipment rinsate samples collected as part of field QA/QC. In the case of the BAPR, where the former southern impact berms are at some depth and covered by Landfill E, potentially impacted deeper soil and groundwater are being evaluated and remediated as part of the Landfill E site under the Main Installation FS.

Based on the review of the SI sampling locations exceeding the cleanup levels (Appendix A), the exceedance locations were divided into two categories:

1. isolated exceedance locations, and
2. adjacent exceedance locations.

An isolated exceedance location was defined as having no adjacent exceedance locations nearby. Adjacent exceedance locations were defined as having no non-exceedance locations or obstruction (buildings or roads) present between them. In general, the adjacent exceedance areas appeared to occur at soil berms or backstops or at the toe of these features. Isolated exceedance

locations are generally present within or just beyond the firing range boundaries in front of or behind the soil berms or backstops.

Based on the site access constraints (sloped land surface, ravines), sensitive vegetation and archeological features, a portion of the samples were collected using hand-held sampling equipment such as trowels and/or hand augers. Remaining samples were collected using direct-push technology (DPT) methods.

The RI sample spacing was generally closer than the previous SI spacing as discussed in Section 4.1.1 of the Work Plan. Isolated exceedance locations were assumed to represent separate and smaller potentially contaminated areas. The biased sample spacing chosen for the isolated exceedance locations was proportionately close at 10 feet apart. Three RI samples were collected in a triangular configuration spaced 10 feet from and around each isolated exceedance location (assuming access is available for these locations). Adjacent exceedance locations are thought to represent more continuous and larger affected areas. Thus, the biased sample spacing chosen was proportionately greater at 25 feet (except at the LCTB as noted below). To position the RI samples at adjacent exceedance locations, an imaginary line was drawn to connect the adjacent locations with samples placed 25 feet away from the line and spaced 25 feet apart along the line.

For areas that were not sampled previously (such as the BAPR or the asphalt paved area at the firing line of the CHP), an unbiased sample grid with 50 foot spacing was selected to characterize potentially impacted areas. Other areas which do not lend themselves to the isolated or adjacent exceedance rationale were further investigated by unbiased grid sampling such as the firing line area east of the soil berm at the LCTB (Figure 7).

The RI sample depths differ for each small arms firing range site and are based on the SI sample depths that exceed cleanup levels. For a given depth where a SI sample exceeded the cleanup level, that depth and a depth 1-foot below were proposed for RI sample collection. For locations where sampling had not been conducted previously, samples were collected at 0.3- and 1-foot depths.

2.1.1 Revisions to the RI/FS Work Plan

In February 2003, the Trust submitted the Work Plan and FSP to DTSC and the Regional Water Quality Control Board (RWQCB) for review and concurrence. Based on discussions on 3 June 2003 between the Trust, the NPS, and the regulators, the following changes were made to the FSP.

- It was concluded in the meeting that the Army's SI analyses performed using handheld field XRF equipment possibly produced unreliable results for barium concentrations (false positives or over-estimations). The revised FSP reduced the number of proposed RI sampling locations that were based on SI results where only barium exceeded cleanup

levels. Thus, proposed RI samples focused on locations where lead, zinc, and/or copper SI results exceeded cleanup goals rather than around the barium only exceedances.

- Sampling locations at CHP were reduced and/or moved to more closely focus on the possibility that the adjacent south hillside was used as a firing backstop, and to focus on lead XRF results from within the most concentrated SI sampling area. In addition, RI sampling locations were reduced in areas away from the firing line and backstop where the source for lead concentrations detected in the SI was not likely from the CHP Pistol Range.

The FSP revisions were outlined in a letter from the Trust to DTSC dated 12 June 2003 (Trust, 2003). The revisions reduced the number of sampling locations from 190 to 147. No changes were made to sampling depths, sampling procedures, COCs, or analytical methods.

2.1.2 Variances from the Work plan

Variances from the Work Plan are summarized below and differentiate between what was expected to occur during the RI field investigation and what actually occurred. These variances are different from the revisions discussed in Section 2.1.1, in that they did not involve a planned change to the Work Plan.

Based on the limited number of bullets or ammunition fragments observed (four at CHP) during RI sampling, sieving was requested on an additional seven samples to provide more information on the potential presence of bullets and munitions fragments. The criteria for requesting additional sample sieving was as follows.

1. Sieve at least one sample from each of the five sites.
2. Sieve the sample from each site with the highest lead, copper, or zinc value that exceeds the cleanup level since these metals would have the higher concentration in munitions.
3. Sieve any soil sample that exceeded the total threshold limit concentration (TTLC) for lead or copper.

Using the above criteria, the following seven samples were sieved based on the indicated metal concentrations.

- Lobos Creek Target Butt – LCBSB24[1], copper at 56 mg/kg
- Lobos Creek Protected Range – LCPSB27[1], zinc at 110 mg/kg
- Machine Gun Butt – MGBSB19[0.3], zinc at 76 mg/kg
- CHP Range – CHPSB05[1], lead at 1,000 mg/kg
CHPSB06[1], lead at 4,700 mg/kg
CHPSB07[1], lead at 6,000 mg/kg and copper at 58 mg/kg
- Barnard Avenue – BAPSB03R[5.5], lead at 230 mg/kg

Table 8 also indicates which samples were sieved. No additional bullets or ammunition fragments were found than those observed at CHP (Section 3.4).

A general variance from the Work Plan included a change to the criteria used to identify samples to be tested for soluble metals. The Work Plan outlined soluble metals testing for samples where total metal concentrations exceeded the total threshold limit concentration (TTLC) value, 10 times the soluble threshold limit concentration (STLC) value, and 20 times the toxicity characteristic leaching potential (TCLP) value. Only lead exceeded the concentrations used to screen samples for additional soluble testing. The TTLC for lead is 1,000 mg/kg. Ten times the STLC for lead is 50 mg/kg; and 20 times the TCLP for lead is 100 mg/kg. Because the soluble metals results are used for waste disposal characterization, soluble lead tests were performed only on samples that also exceeded the lead cleanup level.

Work Plan variances specific to the small arms firing ranges are presented below.

2.1.2.1 Lobos Creek Target Butt

Due to the presence of baserock fill beneath the paved roadway or unpaved trail, the proposed sampling depths for borings LCBSB02, LCBSB03, LCBSB10, and LCBSB24 were modified. The actual sample depths were increased in order to collect samples from native soil. Generally, the proposed sampling intervals at these locations were 0.3 and 1 foot bgs. The actual depths sampled were 1 and 2.5 feet, except at LCBSB10 where soil from 0.5 and 1.5 feet bgs was sampled.

2.1.2.2 Lobos Creek Protected Range

Due to the presence of baserock fill beneath the paved area, the proposed sampling depths for borings LCPSB20, LCPSB21, LCPSB24, and LCPSB25 were modified. The shallow sample at each of these locations was collected from between 1 to 1.5 feet bgs and the deeper sample was collected at 2.5 feet bgs.

2.1.2.3 Machine Gun Butt

No samples were collected from MGBSB01 based on drilling refusal at 10-inches bgs caused by either rock fill or bedrock. Only the proposed 1-foot sample interval was collected from MGBSB13 and MGBSB15 due to refusal caused by bedrock. Sample location MGBSB19 was located in a shallow accumulation of soil overlying a dense tree root layer and only the 0.3 foot sample was collected from MGBSB19.

Although serpentinite and beach/dune sand were thought to be the predominant site lithologies at MGB, some RI samples collected were also representative of Colma lithology. Therefore, Colma lithology background levels were considered in developing initial site cleanup levels as presented in Section 2.2.2.3 and Table 5.

2.1.2.4 California Highway Patrol

None of the proposed samples were collected at CHPSB04 due to refusal at 10-inches bgs, likely caused by encountering the gun battery structure.

Although serpentinite was thought to be the predominant site lithology in the Work Plan, RI soil samples collected were representative of beach/dune sand and Colma lithologies. Therefore, beach/dune sand and Colma lithology background levels were considered in developing initial site cleanup levels as presented in Section 2.2.2.3 and Table 6.

2.1.2.5 Barnard Avenue Protected Range

Actual sample depths at several of the BAPR sampling locations were altered in the field due to the presence of varying amounts of imported fill related to construction of Buildings 808 and 809. Between one to seven feet of imported fill were found at the following locations: BAPSB01, BAPSB02, BAPSB03R, BAPSB04, BAPSB05, BAPSB06, BAPSB07, BAPSB08R, BAPSB10, BAPSB11 and BAPSB12. Only one sample of native soil material was collected at locations BAPSB06 and BAPSB07 because of hard drilling conditions resulted in refusal and, at BAPSB06, breakage of the split spoon sampling equipment occurred. Due to the presence of compacted construction fill, borings BAPSB02, BAPSB03R, BAPSB04, BAPSB08, and BAPSB12, which were originally designated for sampling using the hand-auger, were moved in order to provide access for the DPT drill rig.

Although Colma was thought to be the predominant site lithology in the Work Plan, some RI soil samples collected were also representative of the beach/dune sand lithology. Therefore, beach/dune sand lithology background levels were considered in developing initial cleanup levels as presented in Section 2.2.2.3 and Table 7.

2.2 Data Quality Objectives (DQOs)

The DQO development process guides the decisions and procedures for collecting and analyzing environmental samples and for evaluating the results to ensure that overall project objectives are accomplished. The DQOs are qualitative and quantitative statements that:

- clarify the intended data use,
- define the type(s) of data needed to make the decision,
- identify the conditions under which data should be collected, and
- specify the tolerable limits on the probability of making a decision error due to data uncertainty (EPA, 1999a).

EPA guidance presents DQO development as a seven-step process. The seven-step DQO process for this project follows.

Step 1: State the Problem. The nature and extent of contamination relative to Presidio-wide screening, threshold and cleanup levels is to be determined for the five small firing range sites in sufficient detail to perform the FS.

Step 2: Identify the Decision. The information to be gathered will be used to evaluate remedial actions to address the contamination at the small arms firing ranges.

Step 3: Identify Inputs to the Decision. To develop the remedial action alternatives, SI and RI surface and near-surface soil sampling results will be compared with the cleanup levels developed for the sites. SI screening and definitive data (fixed laboratory) and RI definitive data will be used as input into the decision.

Step 4: Define Study Boundaries. Surface and near-surface soil samples from the five firing range sites were collected and analyzed for COCs and other metals.

Step 5: Develop a Decision Rule. If soil is contaminated above the Presidio-wide cleanup levels, a remedial action alternative shall be developed to address this contamination.

Step 6: Specify Limits on Decision Errors. Analytical results of soil samples were validated in a manner consistent with the QAPP parameters such as accuracy, precision, and representativeness.

Step 7: Optimize the Design for Obtaining Data. Biased sampling is acceptable for sites where previous soil sample results exist. Additional sampling was performed under this RI/FS to further characterize the horizontal and vertical extent of contamination at these sites where cleanup level concentrations are exceeded. Unbiased sampling was conducted at sites where samples were not collected previously (BAPR).

2.2.1 Data Types and Uses

Surface and near-surface soil samples were collected from the five small arms firing ranges and analyzed for the COCs (antimony, barium, copper, lead, and zinc). A portion of the samples (10%) were analyzed for 14 additional SW6010/6020 metals (arsenic, beryllium, cadmium, chromium, cobalt, nickel, selenium, silver, thallium and vanadium, plus aluminum, iron, magnesium, and manganese). The results were compared to cleanup levels to confirm that only antimony, barium, copper, lead, and zinc are the appropriate COCs and that the nature of the contamination has been adequately characterized. Aluminum, iron, magnesium, and manganese results were only to be used if additional background metals evaluation is warranted.

The State and Federal regulators established three hazardous waste criteria with respect to metals. The State established two criteria based on total and soluble metal concentrations: the TTLC, and the STLC based on the California Waste Extraction Test (WET). The WET test

involves a ten times dilution of the sample extract. Soil meeting or exceeding these values is considered a State hazardous waste.

The Federal hazardous waste criteria is based on the soluble metal levels determined by the TCLP test method. Soil with metal concentrations exceeding the Federal criteria is considered a Federal hazardous waste and must be treated to reduce the TCLP levels before it can be disposed of at a landfill. Treatment of this soil can be completed on-site or by disposal at a Class I hazardous waste landfill.

Samples exceeding cleanup levels and exhibiting elevated metal concentrations (ten times the TTLC) were analyzed for soluble metal analyses using the WET or STLC method, and the TCLP method to assess the potential presence of Resource Conservation and Recovery Act (RCRA) or Federal and non-RCRA or California hazardous material for consideration in the FS.

2.2.2 Data Quality Needs

The data quality needs for the project are defined through the following steps:

- Identifying the COCs,
- Determining appropriate analytical levels, and
- Identifying the levels of concern and associated analytical detection limit requirements.

These steps are presented below.

2.2.2.1 Identification of Site Contaminants

The site contaminants are those associated with the ammunition fired at small arms firing ranges. Such ammunition generally contains a projectile (bullet or ball), cartridge case or shell casing containing the bullet, and an ignition system or cap. The bullet or ball contains lead alloy consisting of some copper, tin and antimony (Montgomery Watson, 1997). Antimony is a hardening agent used in bullets, and copper and zinc are the primary components in shell casings and jackets (Pro Act, 1998). The ignition primers are composed of lead styphane and barium nitrate (Montgomery Watson, 1997). According to the military specification MIL-L-13283B, the ammunition typically used by military services usually contains bullets comprised of 90.0 to 99.2 percent lead and antimony (Montgomery Watson, 1997).

Because lead is the main component of ammunition, it is considered the primary COC. Normal operation of a small arms firing range can elevate lead concentrations in soil several percent (one percent = ten thousand parts per million). Antimony, barium, copper, and zinc, are generally in lower concentrations in the environment and should also be considered as COCs (Pro Act, 1998). Previous studies have shown that heavy metal residuals can be indicative of a trend (Montgomery Watson, 1997). Generally lead is present at much higher concentrations than copper, and copper is present at much higher levels than zinc. If barium and antimony are

associated with a firing range, the correlation to lead should be similar to the correlation observed with zinc and copper (Montgomery Watson, 1997). The RI analytical results are compared to the cleanup levels developed below to assess the nature and extent of contamination at the small arms firing range sites, and to evaluate remedial alternatives.

2.2.2.2 Appropriate Analytical Level

The intended use of the data dictates the appropriate analytical level. Because the RI data will be used to evaluate remedial alternatives, Level III (using EPA-approved procedures) data is considered definitive and appropriate. Per the QAPP, at least 10 percent of the definitive data must be in Level IV (rigorous QA/QC protocols and documentation) format to meet data validation requirements.

2.2.2.3 Cleanup Levels and Analytical Detection Limits

The cleanup levels for soil at the small arms firing ranges are based on the values documented in the *Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater, and Surface Water* (Cleanup Levels Document) (EKI, 2002). The cleanup levels presented in that document are based on site-specific preliminary remediation goals (PRGs) calculated for the Presidio and chemical-specific ARARs for PCOCs detected in various media at the Presidio. The site-specific PRGs and chemical-specific ARARs are also compared to naturally occurring or background concentrations of metals in soil to establish cleanup levels for use at most areas of the Presidio. The Cleanup Levels Document (EKI, 2002) also provides a procedure for determining which specific cleanup levels are applicable to a given chemical release site. This process was used in finalizing cleanup levels applicable for the five small arms firing ranges as part of the RI process. Cleanup levels derived for the site lithologies and land uses at the Presidio (serpentinite, Colma Formation, and beach/dune sand) were used to focus sampling for this RI investigation.

The steps followed in developing the initial cleanup levels for the firing ranges are summarized below

1. Identify Site
2. Identify Media
3. Identify Predominant Lithology(ies)
4. Identify Planned Human Land Use and Applicable Cleanup Levels
5. Identify Applicable Ecological Cleanup Levels
6. Identify Whether Petroleum Hydrocarbons and Related Constituents Present
7. If Petroleum Hydrocarbons and Related Constituents Present, Identify Resources to be Protected

8. Screen Site Chemicals Based on the Most Stringent Cleanup Levels from Applicable Cleanup Tables, in accordance with the procedure provided in the Cleanup Level Document (EKI, 2002). The resulting criteria are presented in the following tables.

- Table 3 Cleanup Levels for Metals in Soil at the LCTB
- Table 4 Cleanup Levels for Metals in Soil at the LCPR
- Table 5 Cleanup Levels for Metals in Soil at the MGB
- Table 6 Cleanup Levels for Metals in Soil at the CHP
- Table 7 Cleanup Levels for Metals in Soil at the BAPR

Remedial action alternatives will be developed in the FS to address the risks posed by COCs present at levels above the applicable cleanup levels at each firing range site.

The detection limits for the COCs were established at levels lower than the Presidio-wide cleanup levels to ensure that the analytical methods are sufficiently sensitive to verify the extent of concentrations exceeding the cleanup levels. The selected analytical laboratories were required to meet reporting limits that would enable comparison to cleanup levels. Curtis and Tompkins, Ltd. used EPA Method SW6010B. The reporting limits for this method were low enough to compare the sampling results with the applicable cleanup levels at each firing range site.

2.2.3 Data Quality Indicators

Data quality refers to the validity associated with a data set. The data quality associated with environmental data is a result of the sampling plan rationale, the sampling procedures, and the analytical methods and instrumentation used to measure analyte concentrations. The QAPP (Tetra Tech, 2001) has been designed to ensure that data collected are of known and documented quality and are useful for the intended purpose. Each data quality component has its respective potential sources of uncertainty and biases that can affect data quality. Any source of uncertainty related to the sampling component of the data collection was minimized by consistent use of the Standard Operating Procedures (SOPs), including proper sample handling and transport. The analytical laboratory data quality was measured and evaluated in terms of precision, representativeness, completeness, and comparability parameters as presented in the QAPP (Tetra Tech, 2001).

2.3 Field Investigation

This section presents a description of the RI field tasks and the procedures that were used during the field investigation. Detailed descriptions of the sampling and analysis plan, and field procedures including field documentation are presented in the FSP.

2.3.1 Mobilization for Field Work

The Project Manager and Field Manager assembled the field team and conducted a field investigation kick-off meeting to discuss the FSP and communicate updates on project coordination or site access issues. Through coordination with the Trust, the analytical laboratory and data validation subcontractors were chosen and placed under contract to Treadwell & Rollo.

2.3.1.1 Surveying

The SI sample locations that exceeded the cleanup levels were located and flagged by a licensed land surveyor to provide the framework for identifying the RI sample locations at LCTB, LCPR, MGB, and CHP. Treadwell and Rollo had considered the possibility of using Global Positioning System (GPS) techniques to perform the survey work at the sites. However, due to radio interference in the area and because control had been established near the small arms firing ranges, conventional methods were used.

The SI samples were located based on the coordinates provided to the Trust by Montgomery Watson. At the BAPR, the surveyor located the proposed sample locations and the firing range boundary. Existing maps and field observations regarding the presence of soil berms or backstops and sensitive species or archeological features were also used to position the RI sample locations.

All RI sample locations were positioned and flagged based on the pre-investigation survey or field measurements from surveyed SI sample locations (Photograph 1). A stake was placed at each sampling location with the sample name marked on surveyors flagging tied to the stake (Photograph 2). Surveying was performed by Chaudhary & Associates, Inc., a State-licensed surveyor. The ground surface vertical elevation was measured at each sampling location to within 0.01 foot relative to the National Geodetic Vertical Datum of 1929 and to the Presidio Lower Low Water datum (PLLW). The horizontal locations were surveyed to within 0.1 foot relative to the 1927 North American Datum (NAD), State Plan Coordinate System, California Zone III. All sample locations were clearly identified prior to the Trust performing an underground utility location survey.

A limited number of RI sample locations were moved more than one foot from the original surveyed position due to hard drilling conditions or limited accessibility. These locations were re-surveyed by Chaudhary & Associates, Inc. following the RI sampling. The relocated sampling points were surveyed as described above.

2.3.1.2 Agency and Park Coordination

The Trust notified the regulatory agencies and the NPS a minimum of two weeks prior to the initiation of the field investigation. All relevant review processes including, but not limited to, NPS Project and 5X Review, and Trust N2 Review were completed before the field

investigation. The Trust Project Manager coordinated with Trust and NPS naturalists and archeologists regarding sensitive habitats at or near the small arms firing ranges and appropriate precautions to take during the field investigation. The field team met with Mr. Garrett Lee and Ms. Laura Castellini of the NPS prior to the RI field investigation to discuss the occurrence and location of sensitive habitats at LCPR, LCTB, MGB, and BAPR.

2.3.1.3 Site Access and Permits

Site access and necessary permits were arranged through the Trust Project Manager, Mr. Chris Nelson, prior to performing any field investigation activities at the small arms firing range sites. All intrusive activities were conducted under a Trust excavation permit.

2.3.1.4 Sensitive Habitat and Archeological Considerations

The presence of sensitive habitat at MGB and BAPR is noted on the site maps shown in Figures 4 and 6. Sensitive species are known to exist at LCPR. In addition, sensitive habitat exists at MGB and BAPR (NPS, 2001a). The CHP is an archaeological sensitive area related to the former battery and earthworks (NPS, 2001b). This battery and earthworks were used as the backstop during the CHP active operation (Figure 5).

2.3.1.5 Utility Clearance

The Trust notified Underground Service Alert that intrusive activities would be occurring at least 48 hours prior to the start of sampling activities. Additionally, a Trust utility specialist located and marked the underground lines present at each site. At LCPR, LCTB, and MGB, a utility map was also provided as an attachment to the Trust excavation permit. Utility location occurred following the identification and positioning of the RI sample locations and prior to the start of sampling activities. If a sample location was located within a utility line corridor, the sample location was moved.

2.3.2 Soil Sampling

Soil sampling was conducted in accordance with the Trust Standard Operating Procedure (SOP) for Soil Sampling (SOP No. 1), located in the QAPP. The lithology of the material encountered during sampling was logged per the SOP. The planned RI sample depths were chosen based on the results of data gap analysis and research into small arms firing ranges contamination. Actual sample depths were altered in the field based on the amount of imported fill present at various locations, recovery of soil and refusal due to bunker (CHP) and geologic obstructions.

To prevent disturbance to sensitive habitats and historic archeological features, and to access sloped areas and areas with limited access, a portion of the soil sampling was accomplished using hand-held sampling equipment and methodologies (i.e. hand-auger and/or slide-hammer).

Where hand-held sampling equipment and methodologies was used, the borings were advanced using the hand-auger (Photograph 3) and sampling was conducted using either the hand-auger or the slide-hammer. Samples collected using the hand-auger were transferred to either a six-ounce glass jar (Photograph 4) or a six-inch stainless steel sleeve. In areas where soil recovery was not problematic, the slide-hammer, fitted with six-inch stainless steel sleeves, was used to collect samples. Sampling at the remaining locations was conducted using a DPT drilling rig (Photograph 5) equipped with either a 2-inch split-spoon sampler or a 1.5-inch Envirocore sampler; both types of samplers were prepared with six-inch stainless steel sleeves. The stainless steel sleeves were covered with Teflon™ sheets and sealed with plastic end caps.

Each sample was appropriately labeled, and placed on ice in an insulated container for delivery to Curtis and Tompkins, Ltd., a certified laboratory, and accompanied by a chain-of-custody record during transport. Sampling equipment was either steam-cleaned or decontaminated in a Liquinox™ solution and then rinsed with clean water (Photograph 6). Sample containers were labeled immediately according to the SOP, added to the chain-of-custody, and placed in a cooler chilled to approximately 4°degrees centigrade.

A summary of the sampling and analysis program is presented in Table 8. RI sampling locations for the five sites are illustrated in Figures 7 through 11.

Shallow soil sampling was conducted to evaluate subsurface conditions, by obtaining detailed lithologic descriptions of soil and rock encountered during sampling and collecting soil samples at sufficient depths and extent to define the vertical and lateral extent of COCs. Boring logs from the field investigation activities can be found in Appendix B. Analytical laboratory reports are presented in Appendix C. Data validation was performed on the analytical data in accordance with the QAPP and results are presented in Appendix D.

2.3.2.1 Lobos Creek Target Butt

A total of 42 borings were advanced at LCTB, 17 using hand-held sampling equipment and 25 using a DPT drill rig. The hand-auger was used at all locations sampled using hand-held equipment, except at LCBSB20 where the slide-hammer was used to collect samples. The DPT drill rig (Photograph 7) was equipped with a 2-inch split-spoon sampler. Traffic control signage and barricades were used at sample locations LCBSB02, LCBSB03, and LCBSB06 (Photograph 8). RI sampling locations are illustrated on Figure 7.

2.3.2.2 Lobos Creek Protected Range

A total of 37 borings were advanced at LCPR, 17 using hand-held sampling equipment and 20 using a DPT drill rig equipped with a 2-inch split-spoon sampler. The hand-auger was used at all locations sampled using hand-held equipment except for locations LCPSB01, LCPSB03, and LCPSB05, which were sampled using the slide-hammer. RI sampling locations are illustrated in Figure 8.

2.3.2.3 Machine Gun Butt

A total of 19 borings were advanced at MGB using hand-held sampling equipment. All samples were collected using the slide-hammer. RI sampling locations are illustrated on Figure 9.

2.3.2.4 California Highway Patrol

A total of 27 borings were advanced and sampled at CHP, 20 using the hand-auger and seven using a DPT drill rig equipped with a 2-inch split-spoon sampler. Sample locations are shown on Figure 10.

Visual observations of shell casings and bullets were only recorded at CHP. A bullet was found at approximately 1.5 feet bgs and between sample intervals at location CHPSB07. Shell casings were found in each of the 0.3 foot soil samples submitted for laboratory analysis at locations CHPSB23 and CHPSB24. Each occurrence was reported to Trust and NPS archeologists. In order to get a complete representation of the COC concentrations associated with each sample, shell casings were not removed from samples CHPSB23[0.3] or CHPSB24[0.3]. Sample sieving at the laboratory also revealed a bullet in sample CHPSB07 (Figure 10).

2.3.2.5 Barnard Avenue Protected Range

A total of 18 borings were advanced at BAPR, six using the slide-hammer and 12 using a DPT drill rig. Two of the locations initially advanced using hand-held sampling equipment (BAPSB03 and BAPSB08) were re-drilled with the DPT rig in order to access native soil material. Re-drilled locations were designated BAPSB03R and BAPSB08R and sampled with the split-spoon sampler and the Envirocore sampler, respectively. The remaining 12 locations were advanced using DPT methodologies. Nine of these locations were sampled with the split-spoon sampler and one location was sampled with the Envirocore. The remaining two locations were sampled using both the split-spoon sampler and the Envirocore. The sampling locations are presented on Figure 11 and the RI sampling and analysis program is summarized in Table 8.

2.4 Laboratory Testing and Data Validation

This section discusses the sampling and analytical plan, field quality control samples and the data validation results. Table 8 summarizes the sampling and analytical program for the five sites. Laboratory and data validation summary reports are presented in Appendices C and D, respectively.

2.4.1 Assessment of Soil Sample Results

Sampling results met data quality objectives and data quality indicators with the exception of cadmium detections. Of the additional 14 metals analyzed, only cadmium was reported at concentrations exceeding the site-specific cleanup levels of 0.8 and 1.7 milligrams per kilogram

(mg/kg). Cadmium was reported in 14 of the 35 samples tested (including two duplicate samples). The reported concentrations of cadmium ranged from 0.6 to 1.9 mg/kg. According to the EPA analytical protocol (SW-846), the inductively coupled plasma (ICP) test methodology can potentially result in a positive bias (i.e., false positive) for cadmium caused by an interference with iron. Previous investigators at the Presidio have qualified the magnitude of this positive bias in the range of 1 to 2 mg/kg (STL, 2003). That is, when using ICP to analyze for cadmium, detected values may be elevated by 1 to 2 mg/kg above actual values.

To evaluate whether the cadmium values reported in the initial RI samples represented actual site conditions or a laboratory analysis artifact (i.e., iron interference), the correlation coefficient between the reported cadmium and iron concentrations was calculated. The hypothesis being that if there was a good positive correlation between cadmium and iron, then there was a potential for the known positive bias to affect the cadmium results. The calculated correlation coefficient between cadmium and iron was 0.78 for this data set, indicating a good positive correlation, and suggested that the reported cadmium concentrations may represent false positives rather than actual site conditions.

To further test this hypothesis, the laboratory was directed to reanalyze available RI sample extracts by EPA Method 6020 using ICP Mass Spectrometry (ICP/MS) which has the potential to reduce or eliminate the interference between cadmium and iron. The laboratory had sufficient sample extracts remaining for nine of the 14 original samples that reported the cadmium concentrations exceeding the cleanup levels. The ICP/MS results indicated that the cadmium concentrations are below the detection limit of 0.25 mg/kg in each of the nine samples.

Based on the evaluation of the reported cadmium data, it was concluded that the initial cadmium concentrations reported did not accurately represent site conditions, and that the reported cadmium concentrations did not indicate cleanup level exceedances. A 4 November 2003 letter from Curtis & Tompkins, Ltd. presented in Appendix C provides additional details.

2.4.2 Field Quality Control Samples

Per the QAPP, a total of 10 % of samples were collected as duplicate samples from the five sites. In addition to the duplicate samples, one rinsate sample was collected per day using laboratory supplied deionized water. Two source water samples were collected. Detected concentrations in the field QA/QC results are presented in Table 9.

No metals were detected in the rinse blank samples with the exceptions of copper, iron, and zinc. Copper was detected at 18 µg/L in equipment rinsate sample LCBSB03[0.3]RB[1]. Iron was detected in rinsate sample LCPSB21RBLCPBSB20 at a concentration of 560 µg/L. Zinc was detected in rinsate sample MGBSB02[1]RB[2] at a concentration of 54 µg/L.

Source water samples were obtained from the tap water faucet at Central Magazine and from the drilling subcontractor's (Precision Sampling, Inc.) water tank, as samples DW072503A and DW073103, respectively. Tap water from Central Magazine was used to decontaminate hand-held sampling equipment. DPT equipment was decontaminated using water from Precision's water tank.

Cadmium was detected in source water sample DW073103 at 6.8 µg/L. Copper was detected in source water samples DW072503A and DW073103 at concentrations of 140 µg/L and 130 µg/L respectively. Magnesium was detected in both samples at concentrations ranging between 690 µg/L to 23,000 µg/L. Manganese was detected in source water sample DW073103 at a concentration of 25 µg/L. Zinc was detected in both source water samples at concentrations between 25 µg/L and 600 µg/L.

2.4.3 Sample Preparation

The SI conducted by the Army did not account for the presence of ammunition fragments in the samples collected. Bullets or fragments were expected to be found in only a small percentage of samples, but could signify a large portion of the metal content. This may have affected the analytical results reported in the SI. During the RI, the following procedure was used to account for any bullets found in soil to help determine the contribution of bullets to the overall metal content of the soil sample on an equivalent basis. If bullet fragments were observed in an RI sample:

1. A representative sample was weighed, including the bullets that may be found in the sample.
2. The sample was sieved to remove the bullets and fragments (#10 sieve).
3. The bullets were weighed, bagged, labeled with the sample ID number, and returned to the Trust.
4. A portion of the remainder of the sample was analyzed for the requested analytes.
5. A portion of the remainder of the sample was dried. The dry weight factor was applied to the metals results and reported. On a separate spreadsheet, the weight of the sample and bullets was reported. The dry weight factor was applied, and the percentage of bullets as dry weight was calculated and reported.

Bullets and/or shells casings fragments were only observed in four samples at CHP.

2.4.4 Data Quality Control Summary

DataVal, Inc. performed data validation in accordance with the QAPP and reviewed both the electronic and hard copy laboratory data for RI soil and QC samples. Data Validation Summary Reports are presented in Appendix D. The reports include an evaluation of the relative percent differences (RPDs) for the duplicate samples and the following quality control data (where applicable) for each analytical method:

- Reporting limits
- Holding times
- Target blanks
- Gas chromatograph/mass spectrometer Equipment Tunes
- Initial equipment calibration
- Continuing equipment calibration
- Matrix spike/matrix spike duplicate
- Laboratory control samples
- Surrogate recoveries
- Internal standards

The following data validation qualifiers used by DataVal and shown on our tables are from those recommended in the October 1999b document entitled, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*:

- | | |
|----|---|
| J | The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. |
| J+ | The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample and is estimated with a high bias due to surrogate recovery failure. |
| J- | The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample and is estimated with a low bias due to internal standards failure. |
| U | The analyte was analyzed for, but was not detected above the reported sample quantitation limit. |
| UJ | The analyte was not detected in the reported sample quantitation limit. However, the reported quantitation limit is approximated and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample. |
| R | The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified. |

Overall the data was usable as reported and most QC criteria was met. Quality control acceptance criteria that were not qualified is not discussed below. The summary for qualified data follows.

- Matrix Spike Duplicates

Percent recoveries for one or more of the following metals: aluminum, antimony, barium, copper, iron, magnesium, manganese, selenium, thallium, vanadium and zinc; were outside the 75% to 125 % project acceptance criteria in 31 samples. For these samples, results were quantified with an estimated UJ, J+, or J-. For three samples (MGBSB16[1], BAPSB01[4][MSD] and DUP072203A) percent recovery for antimony was less than 30%. Rejection of this data was required and qualified with R. In matrix spike/matrix spike duplicate (MS/MSD) samples where detected concentrations of metals were greater than four times the amounts spiked in the sample, qualification was not required.

- ICP Serial Dilutions

The percent difference for zinc and copper failed the 10% difference acceptance criteria in samples BAPSB01[4.5][MSD] and DUP072403D, respectively. The detected and non detected results for these metals were qualified as estimated (J/UJ). The percent differences failed the 10% difference acceptance criteria for cobalt (11%), lead (12%), nickel (12%) and zinc (13%) in the serial dilution of sample BAPSB04[1][MSD]. The detected and non-detected results for cobalt, lead, nickel and zinc in the associated samples were qualified as estimated (J/UJ).

- Field Duplicates

A total of 18 out of 31 samples did not meet the relative percent difference (RPD) of 50 percent precision control limit requirement. For a complete list of samples see the data validation report in Appendix D. The imprecision in the results in the field duplicate pairs may be due to the sample matrix and sample non-homogeneity as the pairs are co-located with the duplicate sample comprised of the 6-inch soil interval above or below the primary sample. Since the effect on the quality of the data is not known, data is not qualified for field duplicate failure (Data Val Inc, 2003).

For a complete list of the qualified samples, see Table 2 in the data validation report in Appendix D.

3.0 NATURE AND EXTENT OF CONTAMINATION

RI sampling results are presented in this section. Tables 10 through 14 present summaries of the metals analytical results. Figures 7 through 11 illustrate where no COCs were detected, where detected COC concentrations were below cleanup levels, and where cleanup levels were exceeded. Based on the review of the 14 additional metals that were tested as PCOCs, only cadmium warrants discussion. Based on the discussion presented in Section 2.4.1, cadmium was not retained as a COC. Cleanup level exceedances for the five COCs (antimony, barium, copper, lead, and zinc) and the extent of COC contamination at the five small arms firing ranges are presented below. Cleanup level exceedances are based on the most stringent cleanup level possible at each site.

3.1 Lobos Creek Target Butt

Table 10 presents a summary of the metals results at the LCTB. Figure 7 illustrates cleanup level exceedances in soil.

- Antimony was not detected above laboratory reporting limits in all 94 samples analyzed.
- Barium was detected in all 94 samples analyzed at concentrations ranging between 7.2 mg/kg and 110 mg/kg which are below the cleanup level of 320 mg/kg.
- Copper was detected in all samples at concentrations ranging between 1.9 mg/kg and 56 mg/kg. The cleanup level (43 mg/kg) was exceeded in one sample (LCBSB24[1]).
- Lead was detected in all samples at concentrations ranging between 0.23 mg/kg and 64 mg/kg which are below the cleanup level of 160 mg/kg.
- Zinc was detected in all 94 samples at concentrations ranging between 9.8 mg/kg and 94 mg/kg. The cleanup level (66 mg/kg) was exceeded in two samples (LCBSB36[0.3] and LCBSB36[1]).

Soil impacts have been identified at one sample location in the former soil berm/backstop (LCBSB24) and at one location adjacent to Lobos Creek (LCBSB36) (Figure 7). At LCBSB24, the soil sample collected at 1 foot bgs contained copper at 56 mg/kg which exceeded the cleanup level. However, a duplicate sample (DUP072403B) collected at that location at 1.5 feet bgs did not contain copper greater than the cleanup level (43 mg/kg). At this location, the copper concentration is bound vertically and laterally by samples with no cleanup level exceedances.

At LCBSB36, the soil samples at 0.3 and 1 foot bgs contained zinc at 94 mg/kg and 70 mg/kg, respectively. The zinc concentration in a deeper duplicate sample (DUP073103A at 1.5 feet bgs) did not exceed the cleanup level for zinc. Because the zinc concentration in the duplicate sample is below the cleanup goal, no deeper samples are warranted. The lateral extent of this isolated zinc exceedance is bounded on three sides. The unbounded side is adjacent to Lobos Creek.

3.2 Lobos Creek Protected Range

Table 11 presents a summary of the metals results in soil for the LCPR. Figure 8 presents cleanup level exceedances.

- Antimony was not detected above laboratory reporting limits in the 79 samples analyzed.
- Barium was detected in all 79 samples analyzed at concentrations ranging between 7 mg/kg and 75 mg/kg which are below the cleanup level of 320 mg/kg.
- Copper was detected in all 79 samples analyzed at concentrations ranging between 1.7 mg/kg and 29 mg/kg which are below the cleanup level of 43 mg/kg.
- Lead was detected in all 79 samples analyzed at concentrations ranging between 0.22 mg/kg and 66 mg/kg which are below the cleanup level of 160 mg/kg.
- Zinc was detected in all 79 samples analyzed at concentrations ranging between 9.9 mg/kg and 110 mg/kg. The cleanup level (66 mg/kg) was exceeded in two samples.

Soil impacts are identified at two sample locations, one north of Building 1750 (LCPSB37) and one east of Building 1750 (LCPSB27). At LCPSB27, the shallow (1-foot bgs) soil sample contained a zinc concentration of 110 mg/kg that exceeded the cleanup level. The zinc concentration in the deeper sampler (2 feet bgs) was less than the cleanup level. Therefore, the vertical extent of the zinc exceedance is defined. This sampling location is bounded to the south by a paved area, to the west by Building 1750, and to the north by sampling location LCPSB29 where samples contained zinc concentrations that are less than the cleanup level.

At LCPSB37, the shallow (1 foot bgs) soil sample from this location contained a zinc concentration (85 mg/kg) that exceeds the cleanup level (66 mg/kg). The zinc concentration in a deeper sample (2 feet bgs) was less than the cleanup level. At this location, the vertical extent of the zinc exceedance is defined. The lateral extent at this location, is bounded to the south by Building 1750 and to the north by sample location LCPSB36.

3.3 Machine Gun Butt

Table 12 presents a summary of the metals results in soil for MGB. Figure 9 presents cleanup level exceedances.

- Antimony was not detected above laboratory reporting limits in all 34 samples analyzed.
- Barium was detected in all 34 samples analyzed at concentrations ranging between 12 mg/kg and 190 mg/kg which are below the cleanup level of 320 mg/kg.
- Copper was detected in all 34 samples analyzed at concentrations ranging between 2.8 mg/kg and 29 mg/kg which are below the cleanup level of 120 mg/kg.

- Lead was detected in 33 out of 34 samples analyzed at concentrations ranging between not detected (< 0.16 mg/kg) and 200 mg/kg which are below the cleanup level of 300 mg/kg.
- Zinc was detected in all 34 samples analyzed at concentrations ranging between 13 mg/kg and 76 mg/kg. The cleanup level (60 mg/kg) was exceeded in three sample locations.

Soil impacts at the MGB are identified at one location in the upper hillside (MGBSB16), at one location in the east hillside (MGBSB19), at one location on the lower west hillside (MGBSB06), and at one location in the lower middle hillside (MGBSB04). These locations are shown on Figure 9.

At MGBSB04, the shallowest soil sample (1 foot bgs) exceeded the cleanup level for zinc. The deeper sample (2 feet bgs) contained zinc at a concentration less than the cleanup level; therefore the metal exceedance is defined vertically. The lateral extent is defined by soil samples from locations MGBSB03, MGBSB05, and MGBSB13 that did not contain metal concentrations exceeding the cleanup levels.

At sample locations MGBSB06 and MGBSB16, the shallow soil samples (1 foot bgs) contained cadmium at 1.2 mg/kg and 1.7 mg/kg, respectively. Both locations exceeded the cleanup level for cadmium. Because cadmium is not associated with firing ranges and the reported concentrations may not accurately represent site conditions. As discussed in Section 2.4.1, cadmium is not considered a soil COC.

The shallow soil sample (0.3 feet bgs) from location MGBSB19 contained zinc just above the cleanup level (60 mg/kg) at 76 mg/kg. At this location, bedrock was encountered at 6 to 9 inches bgs that prevented further delineation of the deeper soil. The sample location is on the study area perimeter, and is bounded on the west by three samples with zinc concentrations less than the cleanup level.

3.4 California Highway Patrol Pistol Range

Table 13 presents metals results in soil at the CHP. Cleanup level exceedances are shown on Figure 10.

- Antimony was detected in four out of 80 samples analyzed at concentrations ranging from non detect and 29 mg/kg. The cleanup level (5 mg/kg) was exceeded at one sample location.
- Barium was detected in all 80 samples analyzed at concentrations ranging between 16 mg/kg and 90 mg/kg which are below the cleanup level of 320 mg/kg.

- Copper was detected in all 80 samples analyzed at concentrations ranging between 2.5 mg/kg and 140 mg/kg. The cleanup level (43 mg/kg) was exceeded in two samples.
- Lead was detected in 79 out of 80 samples analyzed at concentrations ranging from not detected to 6,000 mg/kg. The cleanup level (160 mg/kg) was exceeded in seven samples.
- Zinc was detected in all samples analyzed at concentrations ranging between 13 mg/kg and 130 mg/kg. The cleanup level (60 mg/kg) was exceeded in twelve samples.

Soil impacts are identified west of the study area, within the paved picnic area, in the former backstop (target butt), two locations north of the paved picnic area and one location south of the paved picnic area. These locations are shown on Figure 10.

Sampling locations CHPSB02 and CHPSB03 are located west of the study area, near the paved walkway. The shallow soil samples (0.3 feet bgs) at both locations exceeded cleanup levels for lead and zinc (160 mg/kg and 60 mg/kg). Lead concentrations ranged from 180 mg/kg in CHPSB02 to 220 mg/kg in CHPSB03. The shallow sample from CHPSB02 also exceeded the cadmium cleanup level based on the ICP data. The deeper samples at these locations (1 and 2 feet bgs) did not exceed the cleanup levels for these metals; therefore, the vertical extent has been defined. The lateral extent of impacts can be defined as part of remedial action confirmation sampling.

Sample location CHPSB12 is on the hillside south of the firing range. Cadmium was the only metal that exceeded the cleanup levels, based on the ICP data. As discussed in Section 2.4.1, cadmium is not present based on ICP/MS results in other samples and is not retained as a COC.

Sample locations CHPSB22, CHPSB23, CHPSB24, CHPSB25, and CHPSB27 are within the paved area of CHP. Shell casings were observed during field activities at sampling locations CHPSB23 and CHPSB24 (Figure 10). The metals detected above the cleanup levels include cadmium, copper, and zinc. At locations CHPSB22 and CHPSB25, cadmium was reanalyzed using the ICP/MS method and both cadmium results were non-detect. The vertical extent of zinc is not defined at locations CHPSB23 (2.5 feet bgs) or at CHPSB27 (3 feet bgs). The lateral extent is also not defined to the north. However, because of the physical constraints of this area (steep inaccessible slopes), the lateral extent can not be defined. The lateral extent of impacts south of CHPSB24, where copper and zinc exceeded cleanup levels, can be defined during remedial action confirmation sampling.

Sample locations CHPSB05, CHPSB06, CHPSB07, CHPSB08, and CHPSB20 are in the former backstop (target butt) of the CHP Pistol Range. The soil in this area was placed against the brickwork of the historical military battery. One or more of the five COCs (antimony, cadmium, copper, lead, and zinc) was detected at concentrations greater than the cleanup levels at each of these five locations. Bullets were present in samples collected at CHPSB06 and CHPSB07 (Figure 10). At four of the five locations, the metal concentrations decrease with depth to

concentrations less than the cleanup levels. Because only a shallow sample was collected at CHPSB05, the vertical extent at that location is unknown, but is bounded laterally by other adjacent sample locations that demonstrate a decrease in concentration with depth. Therefore, the lateral extent of metals in this portion of the study area is defined.

Soil samples that contained total lead concentrations exceeding the STLC by a factor of 10 or exceed the TTLC were also analyzed for soluble lead. The soluble lead concentrations are used to classify soil for disposal purposes. Typically these analyses are performed as part of the FS to evaluate and estimate treatment or disposal costs; however, these analyses were performed in conjunction with the RI to reduce potential future sampling. Seven soil samples were analyzed for soluble lead using the WET test to compare with STLC values: CHPSB02[0.3], CHPSB03[0.3], CHPSB05[1], CHPSB06[1], CHPSB07[1], CHPSB07[2], and CHPSB07[3]. Three of these samples were also analyzed for soluble lead using the TCLP test: CHPSB05[1], CHPSB06[1], and CHPSB07[1].

The analytical results of the soluble lead tests indicate that soil samples containing total lead concentrations greater than the TTLC value for lead (1,000 mg/kg) also exceed the STLC value for lead (5 milligrams per liter [mg/L] or 5,000 micrograms per liter [µg/L]) and the TCLP value for lead (5 mg/L or 5,000 µg/L). These results indicate that soil exceeding the lead cleanup level that may be excavated as part of site remediation activities will require special handling and disposal appropriate for a Federal, hazardous waste.

3.5 Barnard Avenue Protected Range

Table 14 presents metals results in soil for BAPR. Cleanup level exceedances are shown on Figure 11.

- Antimony was not detected above laboratory reporting limits in all 40 samples analyzed.
- Barium was detected in all 40 samples analyzed at concentrations ranging between 30 mg/kg and 170 mg/kg which are below the cleanup level of 320 mg/kg.
- Copper was detected in 40 samples analyzed at concentrations ranging between 2.6 mg/kg and 70 mg/kg. The cleanup level (43 mg/kg) was exceeded in one sample.
- Lead was detected in 39 out of 40 samples analyzed at concentrations ranging between non detect (0.13 mg/kg) to 230 mg/kg. The cleanup level (160 mg/kg) was exceeded in one sample.
- Zinc was detected in all 40 samples analyzed at concentrations ranging between 14 mg/kg and 350 mg/kg. The cleanup level (60 mg/kg) was exceeded in seven samples.

Soil impacts were identified at three locations surrounding Building 809 in the northeast portion of the study area (BAPSB02, BAPSB03R, and BAPSB04), at three locations in the west

perimeter of the study area bordered by sensitive vegetation (BAPSB12, BAPSB13, and BAPSB18), and at one location on the eastern portion of the study area (BAPSB10).

The shallow (1 foot bgs) sample from BAPSB12 contained cadmium exceeding the cleanup level; whereas, the deeper sample did not, indicating that the vertical extent of cadmium has been defined. Because cadmium is not associated with firing ranges and the reported concentrations may not accurately represent site conditions (as discussed Section 2.4.1), cadmium was not retained as a COC.

The shallow (0.3 feet bgs) sample from BAPSB13 contained cadmium and zinc greater than the cleanup levels. Cadmium and zinc were detected in the sample at 1.7 mg/kg and 210 mg/kg respectively. The deeper (1 foot bgs) sample contained only cadmium greater than the cleanup level based on the ICP data. The BAPSB13 sample extracts were reanalyzed for cadmium using ICP/MS and cadmium was not detected above laboratory reporting limits. Based on the shallow soil cleanup level exceedance for zinc, the lateral extent of contamination has not been defined.

The shallow (0.3 feet bgs) sample from BAPSB18 contained copper and zinc greater than the cleanup levels at 70 mg/kg and 350 mg/kg, respectively. The deeper (1 foot bgs) sample contained only zinc at a concentration greater than the cleanup level at 98 mg/kg. Therefore, the vertical and lateral extent of zinc contamination has not been defined at this location.

At sampling location BAPSB10, the shallow (1 foot bgs) sample contained cadmium above cleanup levels at 1.2 mg/kg based on ICP results. Cadmium was reanalyzed using ICP/MS, with no detection and as discussed in Section 2.4.1, not retained as a COC.

Sampling locations BAPSB02, BAPSB03R, and BAPSB04 each are adjacent to Building 809 at the northeast corner of the study area. Soil samples from each of these contained zinc concentrations exceeding the cleanup level, and the shallow sample at BAPSB03 also contained lead exceeding the cleanup level. Concentrations of zinc ranged from 81 mg/kg in BAPSB02[3] to 200 mg/kg in BAPSB03R[5.5]. Lead was also detected at 230 mg/kg in BAPSB03R[5.5]. Based on these results the lateral extent of contamination has not been defined. The deepest samples from each of these locations did not contain metal concentrations exceeding the cleanup levels; therefore the vertical extent of metals has been defined (Table 14).

One soil sample contained total lead concentrations exceeding the STLC by a factor of 10. Soil sample BAPSB03R[5.5] was analyzed for soluble lead using the WET test for comparison with STLC values. The soluble lead concentrations are used to classify soil for disposal purposes. Typically this analysis is performed as part of the FS to evaluate and estimate treatment or disposal costs; however, this analysis was performed in conjunction with the RI to reduce potential future sampling efforts.

Sample BAPSB03R[5.5] WET results were non detect at < 1,500 µg/L which is less than the STLC value for lead (5 mg/L or 5,000 µg/L). This result indicates that the soil is not a hazardous waste.

4.0 CONTAMINANT FATE AND TRANSPORT

For the purpose of this RI, COCs included antimony, barium, copper, lead, and zinc. Because lead is the main component of ammunition (with respect to mass of the projectile), it is considered the primary COC; whereas, the other COCs are typically minor constituents of ammunition. Barium was not detected above cleanup levels in any of the RI samples and does not appear to be a COC.

4.1 Potential Routes of Contaminant Migration

The potential pathways of migration of COCs associated with the small arms firing ranges are:

- Air migration – emissions of airborne particulates,
- Surface water migration – contamination of sediments, and
- Sediment migration – from rodents, excavation, and dune restoration activities.

The emission of particulates typically occurred as the small arms were discharged during target practice. Metals in the gunpowder and minute fragments of the projectile are released at high velocities as the small arms are fired. These particles disperse in an area nearest to the firing line. Also, as the high velocity projectile hit the target or butt, minute fragments are scattered.

The fine particulates are deposited on the ground surface, and can migrate into the soil through subsequent rain infiltration. The fine airborne particulates can also be transported by surface water runoff and deposited in sediments of streams.

The projectiles that penetrate the target butt can be further transported from their initial deposit by soil movement, natural or man-made. Rodent burrowing into the target butts can expose bullets and fragments that were initially buried. Human activities such as removing the former target butts or other site restoration activities can also redistribute the COCs at the small arms firing ranges.

4.2 Contaminant Persistence

The small arms firing ranges COCs are chemically and physically persistent in the shallow soil. Elemental metals are not readily biodegradable, and therefore remain in the soil. Some metals oxidize or undergo transformation into chemical complexes which make them more soluble and can be transported in the soil via rainwater infiltration or they become accessible to plant uptake via chelation. However, if the plant material containing the chelated metal is not physically removed from the site, the metals will re-enter the soil as the plant dies and decomposes.

4.3 Contaminant Migration

The small arms firing ranges COCs are relatively immobile after their initial deposition. As stated above, rainwater infiltration can cause the minute particulates and soluble fractions to migrate into the soil. However, this process is typically limited to the upper few feet of the soil column. If the pH of the soil is relatively low (acidic), then the soluble fraction of the COCs can potentially migrate further and can at times enter the groundwater. However, most groundwater has a natural buffering capacity (neutral pH) which causes a majority of these dissolved metals to precipitate and retards migration in the groundwater.

The bullets typically do not penetrate the target butt more than a few inches to a few feet, depending on the density and compaction of the target butt soil. The bullets are typically larger and denser than the material that makes up the target butt. As such, through natural unconsolidated soil movement caused by rainwater infiltration and biological disturbance, these bullets and bullet fragments will tend to become exposed at the ground surface over time.

The most significant cause for COC migration at the small arms firing ranges is from human activities, specifically soil excavation and surface grading. As discussed above, the target butts at several of the historical small arms firing ranges have been covered, removed, or graded and are no longer clearly discernable.

5.0 SUMMARY AND CONCLUSIONS

The planned RI was completed at the five small arms firing ranges. The results indicate that at several sample locations, COC concentrations exceed the site-specific cleanup levels. The observed distribution of COCs appears to be consistent with the anticipated location and use of these five historical firing ranges. Bullets, bullet fragments, and other firing range artifacts (shell casings) were observed only at CHP and only at four of the sampling locations.

Antimony, reported as a potential metal alloy to harden lead bullets, was only detected in one of the RI soil samples. That sample was collected at CHP. These results indicate that although antimony may be a common metal alloy of lead ammunition, elemental antimony is not commonly present in soil samples at concentrations above detection limits at the Presidio small arms firing ranges.

The RI results also indicated that barium was not detected in any of the soil samples at concentrations exceeding the cleanup levels. These results further support the hypothesis that the previously reported elevated barium concentrations (as analyzed using field XRF) were anomalously high and do not represent actual site conditions. Although historical documentation suggest that barium may be associated with small arms munitions, the RI data do not support that barium is a COC for these five small arms firing ranges.

The RI results characterize site conditions and identify the presence and distribution of the COCs at each of the five small arms firing ranges to a degree of certainty that allows for the preparation of a FS and future RAP. No additional sampling or remediation appears warranted at LCTB, LCPR, or MGB. Based on the RI soil analytical results, CHP and BAPR may require remedial action. At some CHP and BAPR locations noted above in Section 3, either the lateral or vertical extent of soil with COC concentrations exceeding cleanup levels were not bounded by soil samples with COC concentrations below the cleanup levels. Although additional sampling in these areas is not necessary to further characterize site conditions for this RI, additional samples would be collected as part of future remedial actions as noted on Figures 12 and 13.

At CHP, such samples would be needed southwest of the pavement as well as west and south of CHPSB02 and CHPSB03, respectively, to define the extent of soil requiring removal (Figure 12). At BAPR, localized near surface “hot spot” soil remediation may be warranted and would require additional sampling during remedial activities (Figure 13).

The results of the soluble lead analytical tests indicate that if soil is excavated from some localized areas within CHP, that soil may require handling and disposal as either a State or Federal hazardous waste. Further evaluation of soil treatment, handling, and disposal at those locations will be performed as part of the FS for the small arms firing ranges.

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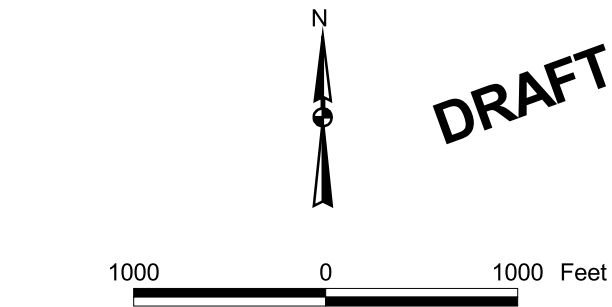
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FIGURES



LEGEND

- Area Depicted on Site Figures
- Firing Range Boundary from Montgomery Watson 1997 SI

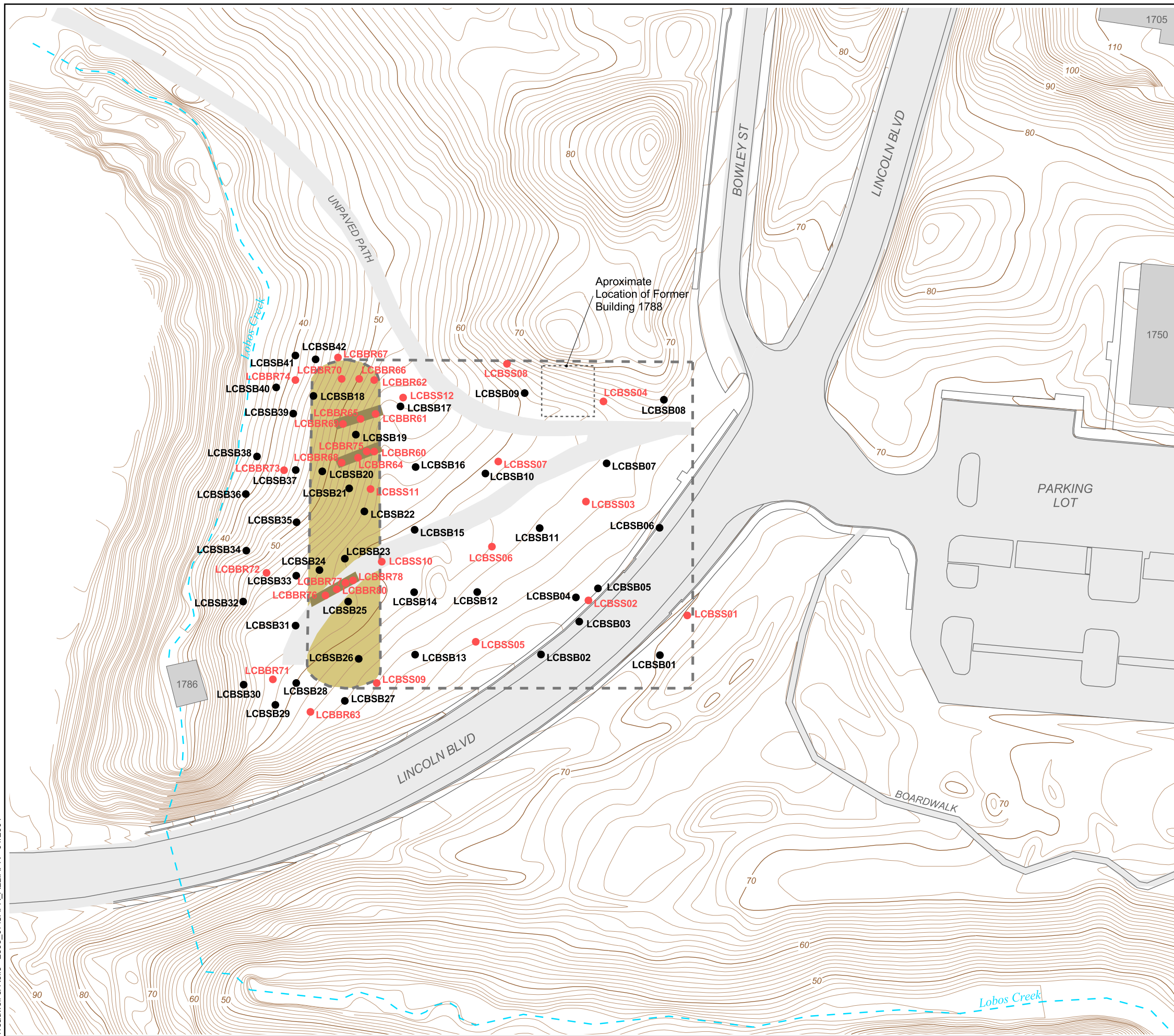


**SMALL ARMS FIRING RANGES
SITE LOCATION MAP**

Treadwell & Rollo



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February 2004



LEGEND

- **LCBSB10** RI Soil Boring
- **LCBSS06** Sample Location from Montgomery Watson 1997 SI
- Firing Range Boundary from Montgomery Watson 1997 SI
- - - Creek
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- Soil Berm
- Former Building
- 1750 Building and Number
- Trench

Notes:
Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

LOBOS CREEK TARGET BUTT SITE MAP

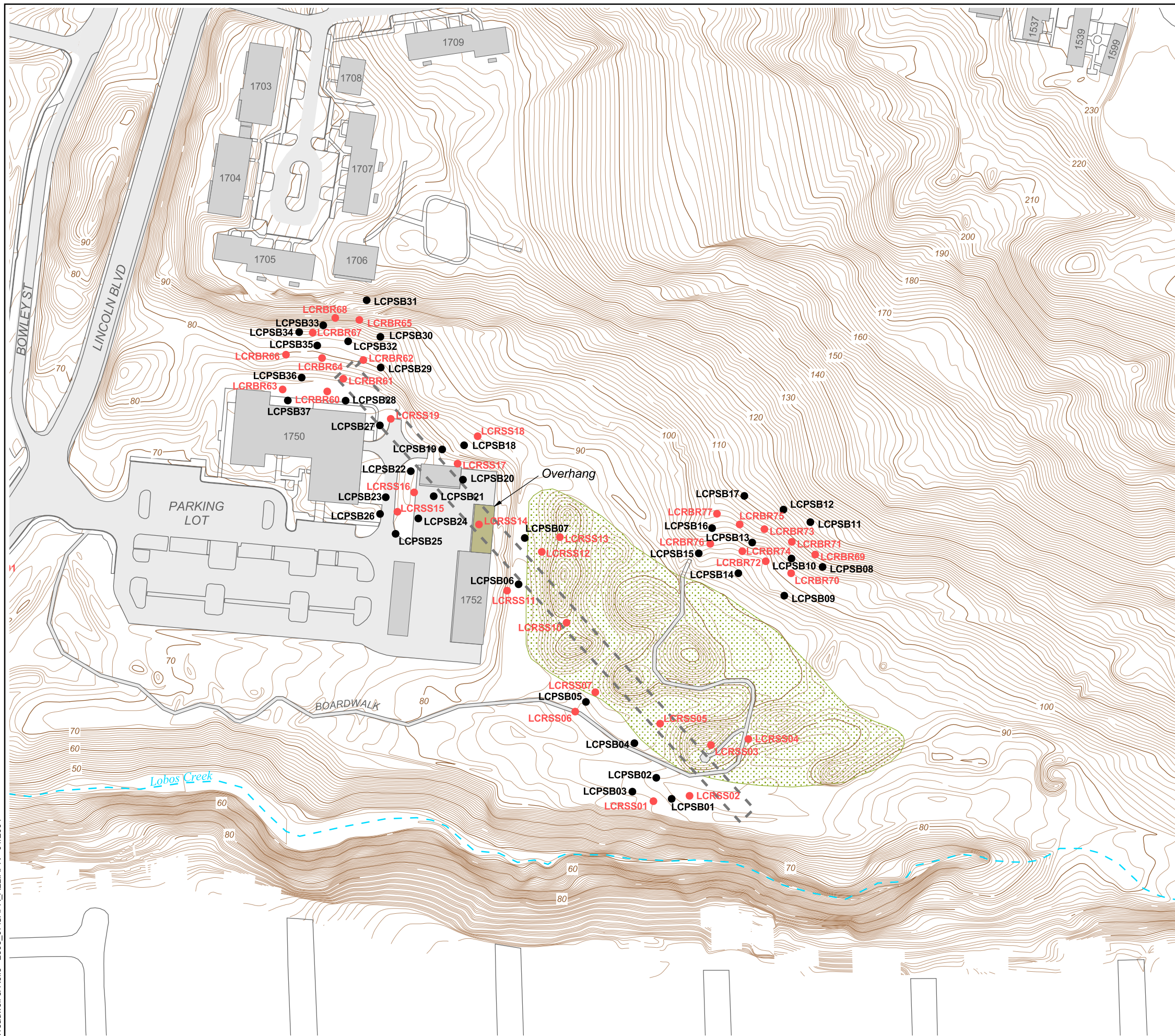
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FIGURE 2



LEGEND

- **LCPSB17** RI Soil Boring
- **LCRBR77** Sample Location from Montgomery Watson 1997 SI
- Firing Range Boundary from Montgomery Watson 1997 SI
- - - Creek
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- Approximate boundary of sand placement and recontouring for Lobos Creek native plant restoration (NPS, 1998). This area contains special status plants.
- 1750 Building and Number

Notes:
Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

LOBOS CREEK PROTECTED RANGE
SITE MAP

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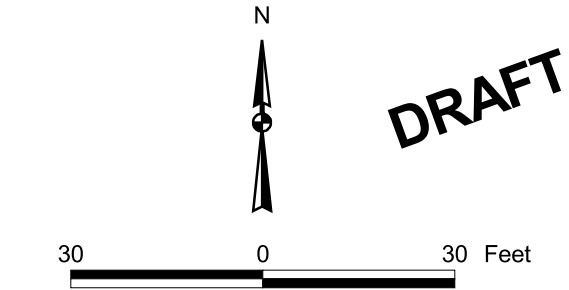
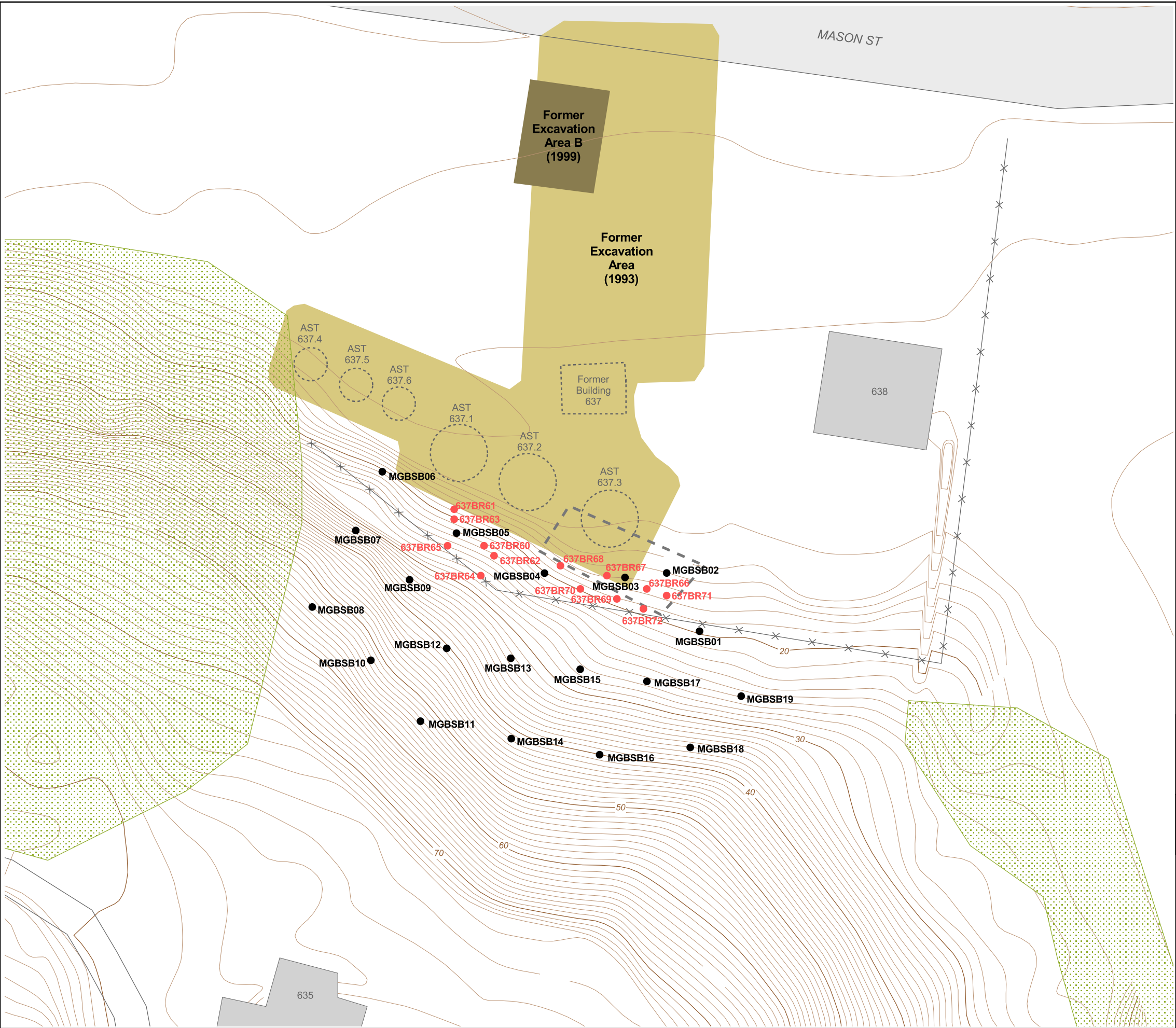


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FIGURE 3

Treadwell & Rollo 2893_07SAFR_ALL-APR 01/2004



DRAFT

- LEGEND**
- **MGBSB17** RI Soil Boring
 - **637BR66** Sample Location from Montgomery Watson 1997 SI
 - Firing Range Boundary from Montgomery Watson 1997 SI
 - x— Fence Boundary
 - Presidio Base Map
 - Topographic Contours (Contour Interval : 10 ft)
 - Former Above Ground Storage Tank
 - Sensitive Habitat (NPS, 2001a)
 - 638 Building and Number

Notes:
Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

MACHINE GUN BUTT
SITE MAP

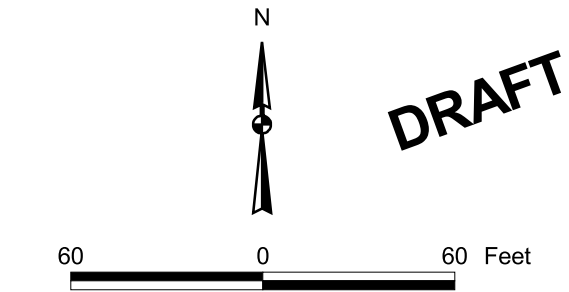
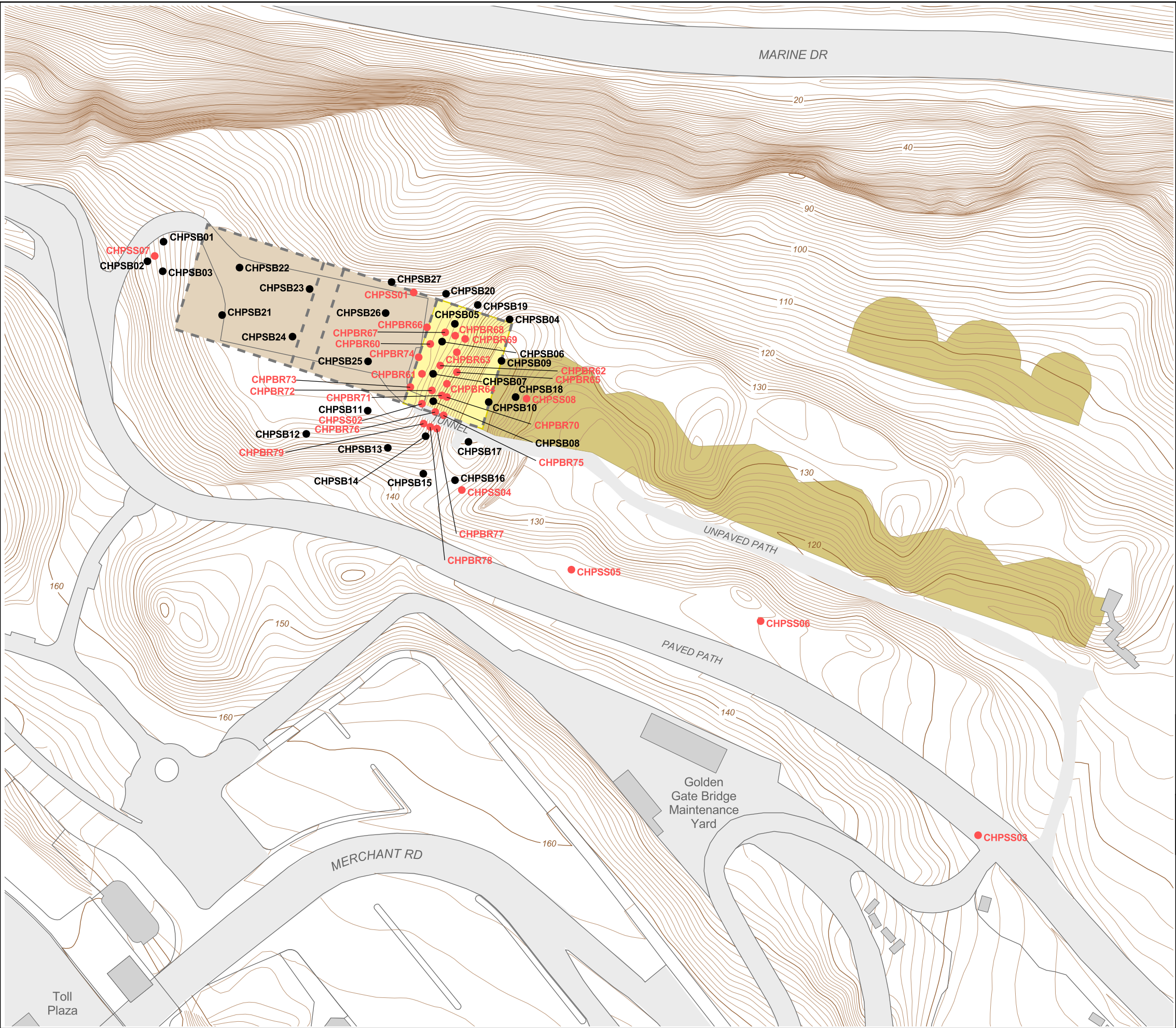
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FIGURE 4

Treadwell & Rollo 2893_07SAFR_ALLAPR 01/2004



- LEGEND**
- **CHPSB01** RI Soil Boring
 - **CHPSS05** Sample Location from Montgomery Watson 1997 SI
 - - - Firing Range Boundary from Montgomery Watson 1997 SI
 - Presidio Base Map
 - Topographic Contours (Contour Interval : 10 ft)
 - Yellow Box Battery Portions Used as Backstop
 - Green Box Gun Battery East
 - Tan Box Pavement
 - Grey Box Building

Notes:
Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

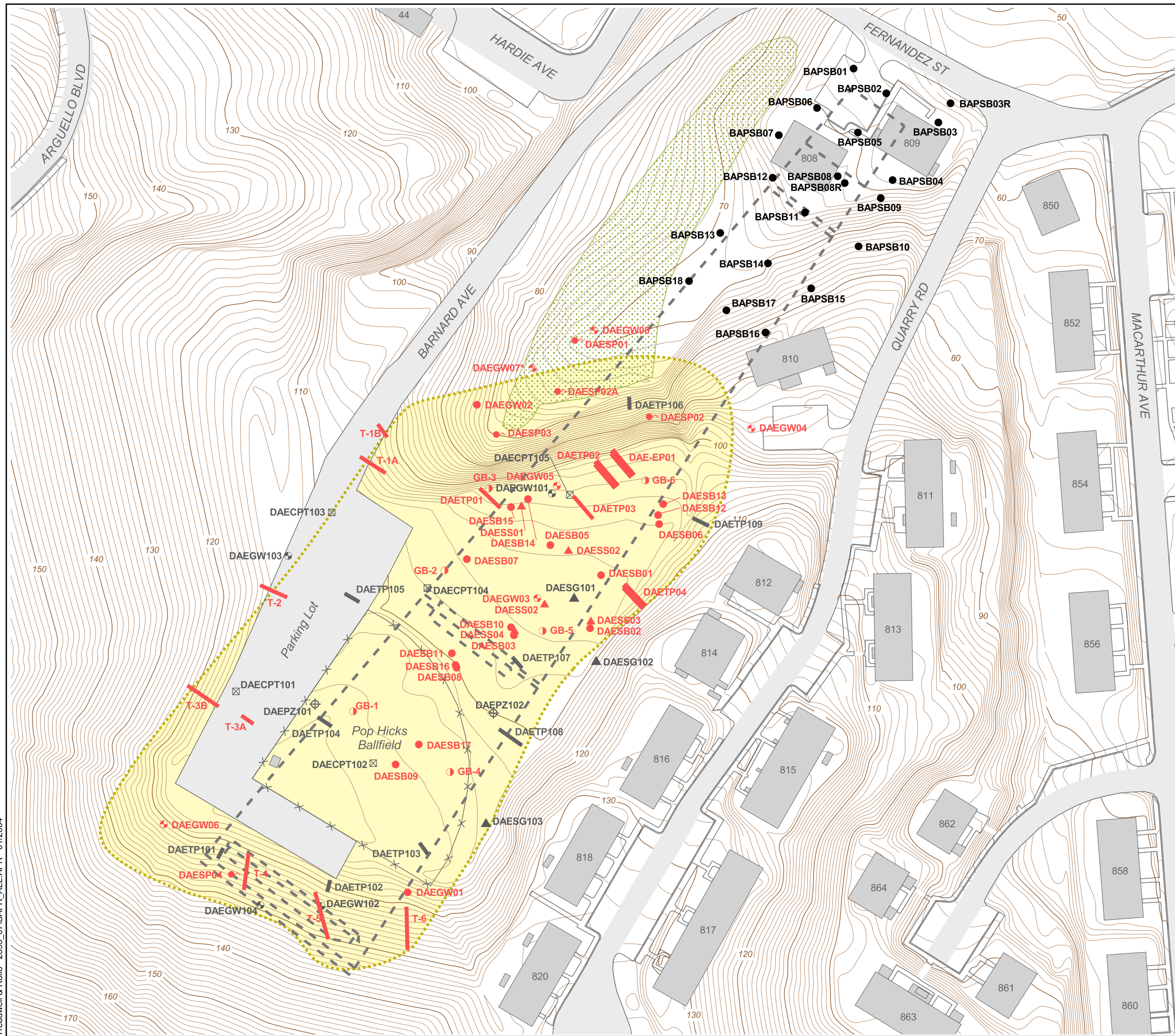
**CALIFORNIA HIGHWAY PATROL
PISTOL RANGE
SITE MAP**

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FIGURE 5



LEGEND

- BAPSB08 RI Soil Boring
- ⊕ DAEGW04 Army Groundwater Monitoring Well
- DAESB12 Army Soil Boring
- ▲ DAESS02 Army Surface Soil Sample
- ⊙ DAESP04 Army Surface Water Sample
- GB-5 Army Geotechnical Soil Boring
- DAETP04 Army Test Pit or Trench
- ⊠ DAECPT102 Trust CPT Location
- ⊕ DAEPZ102 Trust Piezometer
- ⊙ DAEGW104 Trust Groundwater Monitoring Well
- ▲ DAESG102 Trust Soil Gas Probe
- DAETP106 Trust Trench
- - - Firing Range Boundary from 1909 Map from NPS GGNRA Archives
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- ⬢ Sensitive Habitat (NPS, 2001a)
- ⬢ Landfill E Boundary from Draft Landfill E Field Sampling Report (EKI & Golder, 2003).
- 811 Building and Number

Notes:
Firing range effects beneath the landfill were investigated as part of the 2002 Landfill E investigation, and the results will be reported in the Draft Landfill E Field Sampling Report (EKI & Golder, 2003).

Base map was provided by the Presidio Trust in June 2003.
Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

BARNARD AVENUE PROTECTED RANGE SITE MAP

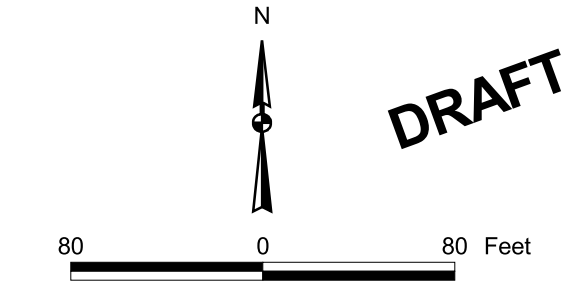
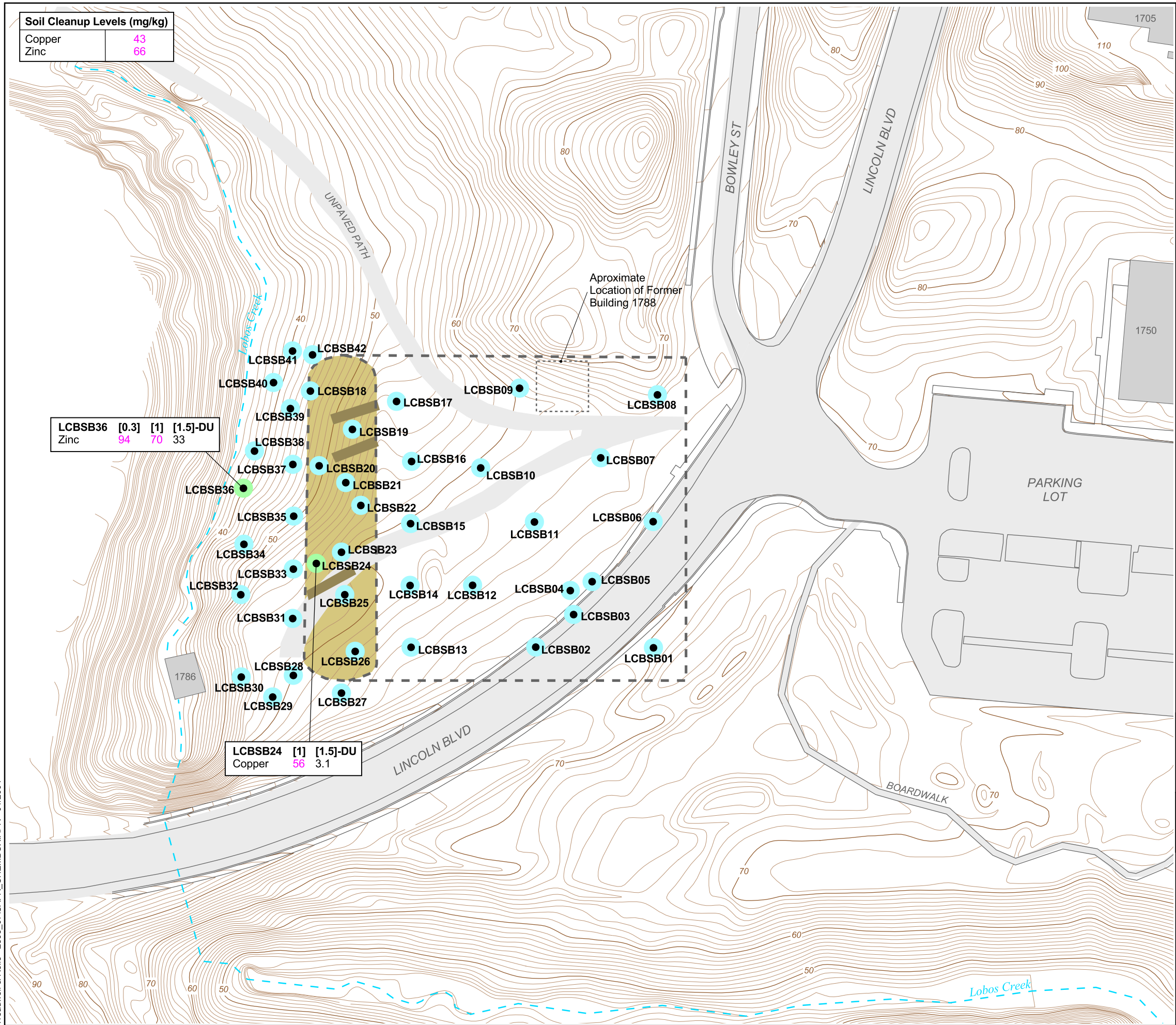
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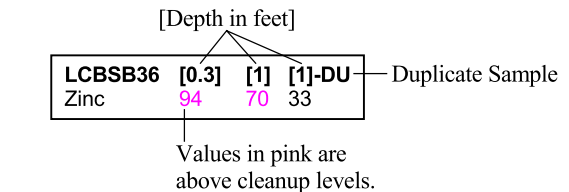
FIGURE 6

Treadwell & Rollo 2893_07SAFR_CHEMBOX.APR 01/2004



LEGEND

- Soil Boring (COC Concentrations Below Cleanup Levels)
- One or more COCs in samples from this location exceeded a cleanup level, but additional sampling is not recommended.
- Firing Range Boundary from Montgomery Watson 1997 SI
- Creek
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- Soil Berm
- Former Building
- Building and Number
- Trench



Notes:
Results reported in milligrams/kilogram (mg/kg).

COC - Contaminant of Concern

Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

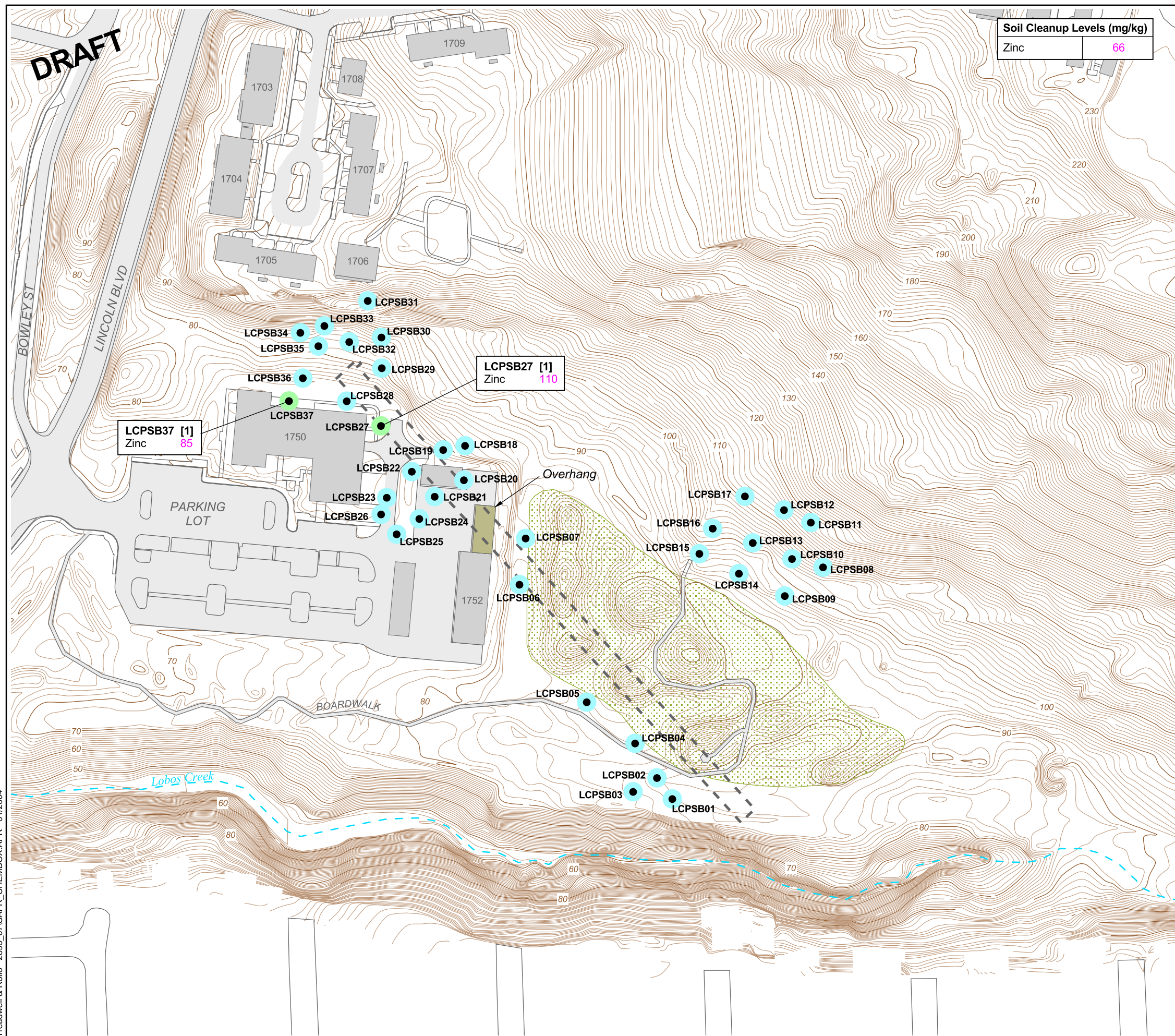
LOBOS CREEK TARGET BUTT
RI CLEANUP LEVEL EXCEEDANCES

Treadwell&Rollo



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FIGURE 7



Soil Cleanup Levels (mg/kg)	
Zinc	66

LEGEND

- Soil Boring (COC Concentrations Below Cleanup Levels)
- One or more COCs in samples from this location exceeded a cleanup level, but additional sampling is not recommended.
- Firing Range Boundary from Montgomery Watson 1997 SI
- - - Creek
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- Approximate boundary of sand placement and recontouring for Lobos Creek native plant restoration (NPS, 1998). This area contains special status plants.
- 1750 Building and Number

[Depth in feet]

LCPSB27 [1]
Zinc
110

Values in pink are above cleanup levels.

Notes:
Results reported in milligrams/kilogram (mg/kg).

COC - Contaminant of Concern

Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

LOBOS CREEK PROTECTED RANGE RI CLEANUP LEVEL EXCEEDANCES

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FIGURE 8

DRAFT

MASON ST

Soil Cleanup Levels (mg/kg)	
Cadmium	0.8
Zinc	60

Former
Excavation
Area B
(1999)

Former
Excavation
Area
(1993)

Former
Building
637

638

MGBSB06 [1] [1]-ICP/MS **
Cadmium 1.2 < 0.25

MGBSB04 [1] [1.5]-DU
Zinc 63 64 J-

MGBSB19 [0.3]
Zinc 76

MGBSB16 [1] [1]-ICP/MS **
Cadmium 1.7 < 0.25

635



LEGEND

- Soil Boring (COC Concentrations Below Cleanup Levels)
- One or more COCs in samples from this location exceeded a cleanup level, but additional sampling is not recommended.
- Firing Range Boundary from Montgomery Watson 1997 SI
- × Fence Boundary
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- Former Above Ground Storage Tank
- Sensitive Habitat (NPS, 2001a)
- 638 Building and Number

[Depth in feet]

MGBSB04 [1] [1.5]-DU
Zinc 63 34 J- Duplicate Sample
Data Qualifiers

Values in pink are above cleanup levels.

* Bedrock encountered at 6 to 9 inches below surface, no soil sample collected or only 0.3-foot sample collected.

** Samples reanalyzed for cadmium by ICP/MS. Initial detections due to ICP interference caused by iron.

Notes:
Results reported in milligrams/kilogram (mg/kg).

COC - Contaminant of Concern
ICP/MS - Inductively Coupled Plasma Mass Spectrometry
ICP - Inductively Coupled Plasma

Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

MACHINE GUN BUTT
RI CLEANUP LEVEL EXCEEDANCES

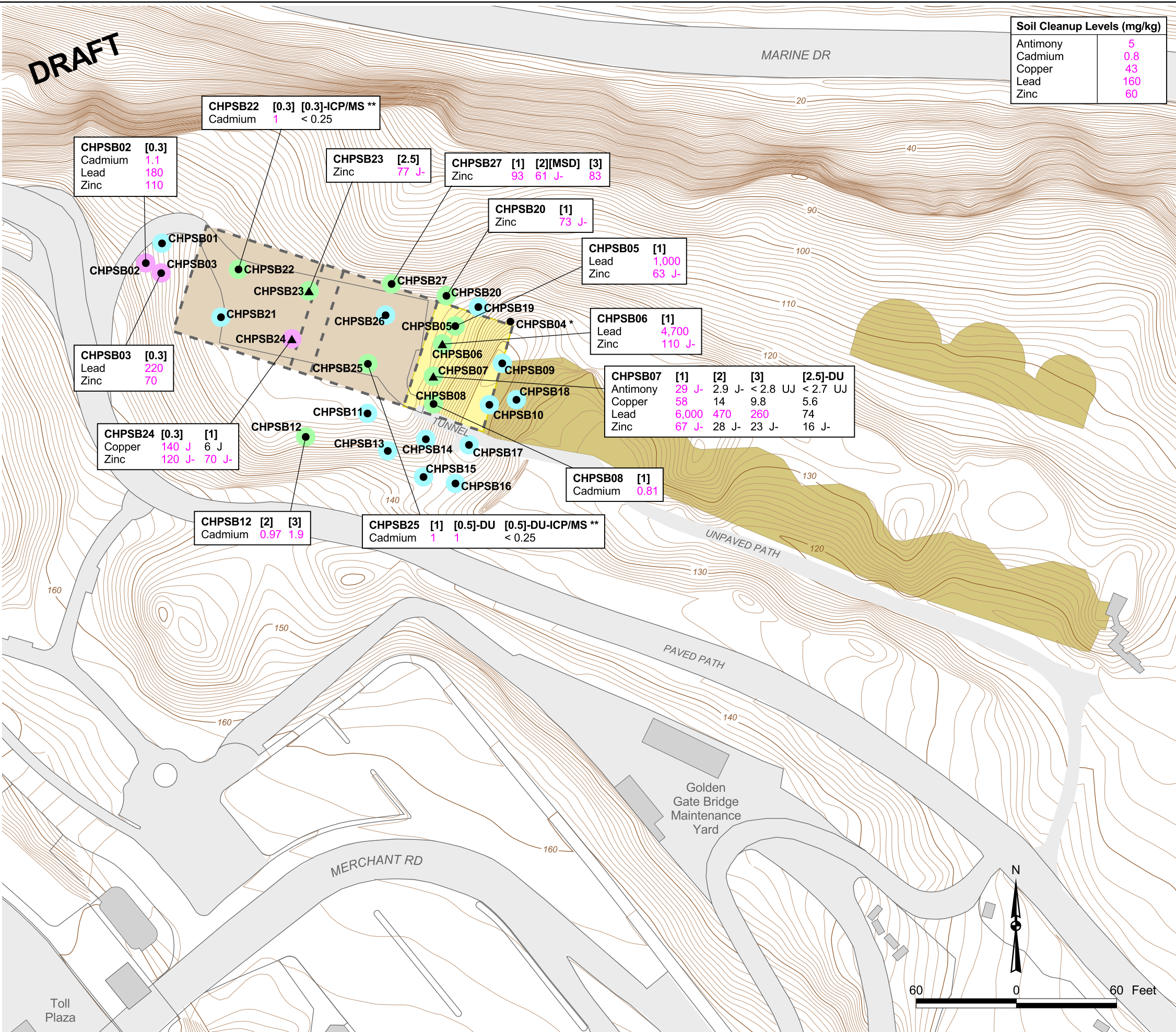
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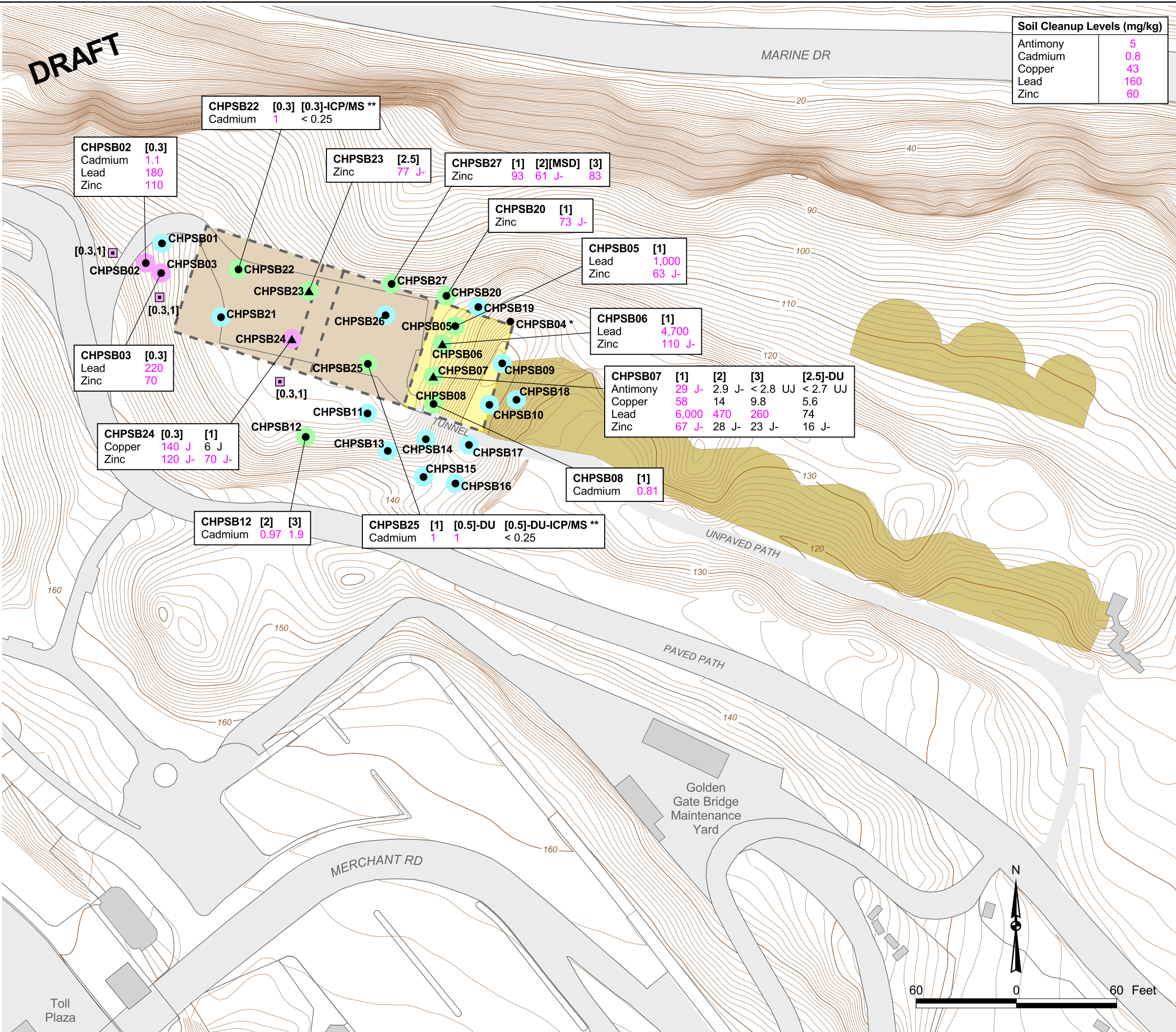
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February 2004

FIGURE 9

Treadwell & Rollo 2893_07SAFR_CHEMBOX.APR 01/2004



Treadwell & Rollo 2893_07SAFR_PROPOSED.APR 01/2004



Soil Cleanup Levels (mg/kg)	
Antimony	5
Cadmium	0.8
Copper	43
Lead	160
Zinc	60

LEGEND

- Soil Boring (COC Concentrations Below Cleanup Levels)
- One or more COCs in samples from this location exceeded a cleanup level, but additional sampling is not recommended.
- One or more COCs in samples from this location exceeded a cleanup level.
- [0.3,1] Proposed Remedial Action Sampling Location [Depth in feet]
- ▲ Bullets and/or Shell Casings Present
- - - Firing Range Boundary from Montgomery Watson 1997 SI
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- Battery Portions Used as Backstop
- Gun Battery East
- Building
- Pavement

[Depth in feet]				Duplicate Sample
CHPSB07	[1]	[2]	[3]	[3]-DU
Antimony	29 J-	2.9 J-	< 2.8 UJ	< 2.7 UJ
Copper	58	14	9.8	5.6
Lead	6,000	470	260	74
Zinc	67 J-	28 J-	23 J-	16 J-

Values in pink are above cleanup levels. Data Qualifiers

* Subsurface obstruction encountered at 10 inches below surface, no soil sample collected.

** Samples reanalyzed for cadmium by ICP/MS. Initial detections due to ICP interference caused by iron.

Notes:
Results reported in milligrams/kilogram (mg/kg).

COC - Contaminant of Concern
ICP/MS - Inductively Coupled Plasma Mass Spectrometry
ICP - Inductively Coupled Plasma

Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

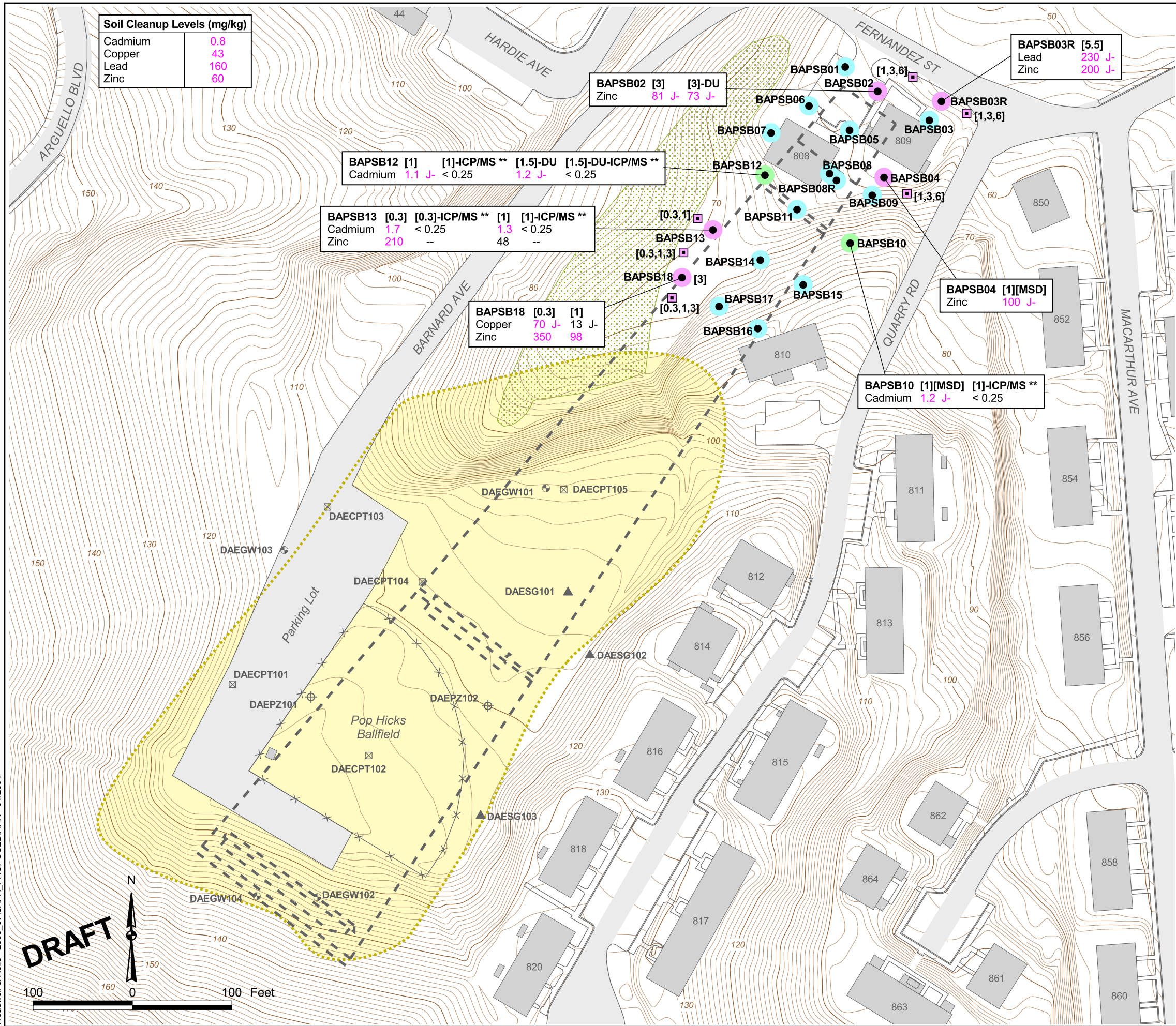
CALIFORNIA HIGHWAY PATROL
PISTOL RANGE
PROPOSED SAMPLING LOCATIONS

Treadwell&Rollo



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FIGURE 12



LEGEND

- Soil Boring (COC Concentrations Below Cleanup Levels)
 - One or more COCs in samples from this location exceeded a cleanup level, but additional sampling is not recommended.
 - One or more COCs in samples from this location exceeded a cleanup level.
 - Proposed Remedial Action Sampling Location [Depth in feet]
 - DAECPT102 Trust CPT Location
 - DAEPZ102 Trust Piezometer
 - DAEGW104 Trust Groundwater Monitoring Well
 - DAESG102 Trust Soil Gas Probe
 - Firing Range Boundary from 1909 Map from NPS GGNRA Archives
 - Presidio Base Map
 - Topographic Contours (Contour Interval : 10 ft)
 - Landfill E Boundary from Draft Landfill E Field Sampling Report (EKI & Golder, 2003)
 - Sensitive Habitat (NPS, 2001a)
 - Building and Number
- [Depth in feet] Duplicate Sample
- | | | | | |
|---------|--------|---------------|--------|------------------|
| BAPSB12 | [1] | [1]-ICP/MS ** | [1]-DU | [1]-DU-ICP/MS ** |
| Cadmium | 1.1 J- | < 0.25 | 1.2 J- | < 0.25 |
- Values in pink are above cleanup levels. Data Qualifiers

** Samples reanalyzed for cadmium by ICP/MS. Initial detections due to ICP interference caused by iron.



Notes:
Results reported in milligrams/kilogram (mg/kg).
COC - Contaminant of Concern
ICP/MS - Inductively Coupled Plasma Mass Spectrometry
ICP - Inductively Coupled Plasma

Firing range effects beneath the landfill were investigated as part of the 2002 Landfill E investigation, and the results will be reported in the Draft Landfill E Field Sampling Report (EKI & Golder, 2003).

Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

BARNARD AVENUE
PROTECTED RANGE
PROPOSED SAMPLING LOCATIONS



Presidio Trust

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FIGURE 13

TABLES

Table 1
Regulatory Status Matrix
Small Arms Firing Ranges
Presidio of San Francisco, California

Location	Army Investigation	Presidio Trust Status
Directorate of Engineering and Housing Area	SI ¹	Crissy Field RAP ⁴
Lobos Creek Target Butt (near Building 1788)	SI	Small Arms Firing Ranges RI/FS
Lobos Creek Protected Range	SI	Small Arms Firing Ranges RI/FS ²
Lobos Creek Rifle Range	Eliminated (contains Lobos Creek Target Butt and Protected Range, listed above)	–
Barnard Ave. Protected Target Range	RI/FS (partially covered by Landfill E)	Small Arms Firing Ranges RI/FS (Landfill E covered by Main Installation FS ³)
Pistol Range at the National Cemetery	Eliminated (under cemetery)	–
Pistol Range (southwest of Building 633)	RI/FS	Main Installation FS
Target Range (southwest of Building 924)	SI	Crissy Field RAP ⁴
Machine Gun Butt (southeast of Building 637)	SI	Small Arms Firing Ranges RI/FS
Crissy Field Skeet Range	SI	Crissy Field RAP
Crissy Field Rifle Institute	SI	Crissy Field RAP
California Highway Patrol Pistol Range	SI	Small Arms Firing Ranges RI/FS

Notes

¹ Site Investigation (SI) conducted by Montgomery Watson in 1996 (Montgomery Watson, 1997).

² RI/FS – Remedial Investigation/ Feasibility Study

³ Feasibility Study (FS) for the Main Installation Sites (EKI, 2003).

⁴ Final Remedial Action Plan (RAP) Crissy Field Area (Army and DTSC, 1998) is currently being implemented.

Table 2
Historical Summary of Small Arms Firing Range Activities
Small Arms Firing Ranges
Presidio of San Francisco, California

Location	Date of Maps Where Location Shown	Date of Map Where Firing Range First Not Shown	Approximate Dates in Use	Area Regraded?	Approximate Troop Numbers	Likelihood of Encountering Projectiles¹
Lobos Creek Target Butt	1907 ² , 1910 ² , 1915	1916	1896 ² to 1902 ²	No ³	1,000	Moderate
Lobos Creek Protected Range	1907, 1910	1912	1902 ² -1910	Yes (1998 dune restoration)	1,000	Low
Machine Gun Butt (southeast of Bldg. 637)	1939, 1942	1943	Late 1930s to early 1940s	Partially (1993 tank and soil removal)	3,000	Moderate
CHP Pistol Range	1949, 1959, 1961, 1962	1964	1944 ² s to 1960s ²	Yes	3,000-4,000	High
Barnard Avenue Protected Target Range	1907 ² , 1909, 1910, 1921	1928	1907 ² to mid- 1920 ² s	Yes (Partially filled in as Landfill E)	1,000-2,000	Low

Notes

Likelihood of encountering projectiles is based on the years of range operation, the approximate troop numbers for the given period of range operation, and regrading activities at the former firing ranges.

² *Archive Search Report, Presidio of San Francisco*. (U.S. Army Corps of Engineers, 2003)

³ Portion of target butts made of dune deposit may have been blown away by wind.

From *Site-Specific Work Plan for Environmental Soil Investigation of the Small Arms Firing Ranges* (Montgomery Watson, 1996), unless otherwise noted.

Table 3
Cleanup Levels for Metals in Soil
Lobos Creek Target Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

Potential Chemical of Concern	Protection of Human Health Recreational Cleanup Level (mg/kg)	Protection of Ecological Receptors Special Status Species Cleanup Level (mg/kg)	Most Stringent Cleanup Level (mg/kg)
	Beach/Dune Sand	Beach/Dune Sand	Beach/Dune Sand
Inorganic Chemicals			
Antimony	70	5.0	5.0
Arsenic	5.9 ^a	10	5.9
Barium	12,000	320	320
Beryllium	350	10	10
Cadmium	4.2	1.7 ^a	1.7
Chromium	2,800	120 ^a	120
Cobalt	10,000	20	20
Copper	---	43 ^a	43
Lead	500	160	160
Nickel	3,500	70 ^a	70
Selenium	870	0.75 ^a	0.75
Silver	870	2.0	2.0
Thallium	14	1.0 ^a	1.0
Vanadium	1,600	92 ^a	92
Zinc	52,000	66 ^a	66

Notes

^a Cleanup level for this compound and this lithology is based on the background level in soil.

Source: Table 7-2 Summary of Selection of Preliminary Remediation Goals and Proposed Cleanup Levels for Non-Petroleum Compounds in Soil from Presidio-wide Cleanup Levels Document (EKI, 2003)

Table 4
Cleanup Levels for Metals in Soil
Lobos Creek Protected Range
Small Arms Firing Ranges
Presidio of San Francisco, California

Potential Chemical of Concern	Protection of Human Health Recreational Cleanup Level (mg/kg)	Protection of Human Health Commercial/Industrial Cleanup Level (mg/kg)	Protection of Ecological Receptors Buffer Zone Cleanup Level (mg/kg)	Protection of Ecological Receptors Special Status Species Cleanup Level (mg/kg)	Most Stringent Cleanup Level (mg/kg)
	Beach/Dune Sand	Beach/Dune Sand	Beach/Dune Sand	Beach/Dune Sand	Beach/Dune Sand
Inorganic Chemicals					
Antimony	70	760	5.0	5.0	5.0
Arsenic	5.9 ^a	5.9 ^a	64	10	5.9
Barium	12,000	130,000	500	320	320
Beryllium	350	3800	10	10	10
Cadmium	4.2	16.0	1.7 ^a	1.7 ^a	1.7
Chromium	2,800	11,000	120 ^a	120 ^a	120
Cobalt	10,000	110,000	48	20	20
Copper	---	---	120	43 ^a	43
Lead	500	3,500	300	160	160
Nickel	3,500	38,000	71	70	70
Selenium	870	9,400	1.1	0.75 ^a	0.75
Silver	870	9,400	2.0	2.0	2.0
Thallium	14	150	1.0	1.0 ^a	1.0
Vanadium	1,600	17,000	92 ^a	92 ^a	92
Zinc	52,000	570,000	66 ^a	66 ^a	66

Notes

^a Cleanup level for this compound and this lithology is based on the background level in soil.

Source: Table 7-2 Summary of Selection of Preliminary Remediation Goals and Proposed Cleanup Levels for Non-Petroleum Compounds in Soil from Presidio-wide Cleanup Levels Document (EKI, 2003)

Table 5
Cleanup Levels for Metals in Soil
Machine Gun Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

Potential Chemical of Concern	Protection of Human Health Recreational Cleanup Level (mg/kg)			Protection of Ecological Receptors Buffer Zone Cleanup Level (mg/kg)			Most Stringent Cleanup Level (mg/kg)		
	Serpentinite	Beach/Dune Sand	Colma	Serpentinite	Beach/Dune Sand	Colma	Serpentinite	Beach/Dune Sand	Colma
Inorganic Chemicals									
Antimony	70	70	70	5.0	5.0	5.0	5.0	5.0	5.0
Arsenic	5.4 ^a	5.9 ^a	6.2	64	64	64	5.4	5.9	6.2
Barium	12,000	12,000	12,000	500	500	500	500	320	320
Beryllium	350	350	350	10	10	10	10	10	10
Cadmium	4.2	4.2	4.2	1.9 ^a	1.7 ^a	0.8 ^a	1.9	1.7	0.8
Chromium	2,800	2,800	2,800	1,700 ^a	120 ^a	140 ^a	1700	120	140
Cobalt	10,000	10,000	10,000	170 ^a	48	48	170	20	21
Copper	---	---	---	120	120	120	120	43	49
Lead	500	500	500	300	300	300	300	160	160
Nickel	4,500 ^a	3,500	3,500	4,500 ^a	71	110 ^a	4,500	70	110
Selenium	870	870	870	1.1	1.1	1.1	1.1	0.75	0.5
Silver	870	870	870	2.0	2.0	2.0	2.0	2.0	2.0
Thallium	14	14	14	1.0	1.0	1.0	1.0	1.0	1.0
Vanadium	1,600	1,600	1,600	74 ^a	92 ^a	90 ^a	74	92	90
Zinc	52,000	52,000	52,000	160 ^a	66 ^a	60 ^a	160	66	60

Notes

^a Cleanup level for this compound and this lithology is based on the background level in soil.

Source: Table 7-2 Summary of Selection of Preliminary Remediation Goals and Proposed Cleanup Levels for Non-Petroleum Compounds in Soil from Presidio-wide Cleanup Levels Document (EKI, 2003)

Although serpentinite and beach/dune sand were thought to be the predominant site lithologies in the Work Plan, some RI soil samples collected were also representative of Colma lithology.

Table 6
Cleanup Levels for Metals in Soil
California Highway Patrol Pistol Range
Small Arms Firing Ranges
Presidio of San Francisco, California

Potential Chemical of Concern	Protection of Human Health Recreational Cleanup Level (mg/kg)		Protection of Ecological Receptors Buffer Zone Cleanup Level (mg/kg)		Protection of Ecological Receptors Special Status Species Cleanup Level (mg/kg)		Most Stringent Cleanup Level (mg/kg)	
	Beach/Dune Sand	Colma	Beach/Dune Sand	Colma	Beach/Dune Sand	Colma	Beach/Dune Sand	Colma
Inorganic Chemicals								
Antimony	70	70	5.0	5.0	5.0	5.0	5.0	5.0
Arsenic	5.9 ^a	6.2 ^a	64	64	10	10	5.9	6.2
Barium	12,000	12,000	500	500	320	320	320	320
Beryllium	350	350	10	10	10	10	10	10
Cadmium	4.2	4.2	1.7 ^a	0.8	1.7 ^a	0.8 ^a	1.7	0.8
Chromium	2,800	2,800	120 ^a	140 ^a	120 ^a	140 ^a	120	140
Cobalt	10,000	10,000	48	48	20	21 ^a	20	21
Copper	---	---	120	120	43 ^a	49 ^a	43	49
Lead	500	500	300	300	160	160	160	160
Nickel	3,500	3,500	71	110 ^a	70	110 ^a	70	110
Selenium	870	870	1.1	1.1	0.75 ^a	0.5 ^a	0.75	0.5
Silver	870	870	2.0	2.0	2.0	2.0	2.0	2.0
Thallium	14	14	1.0	1.0	1.0 ^a	1.0	1.0	1.0
Vanadium	1,600	1,600	92 ^a	90 ^a	92 ^a	90 ^a	92	90
Zinc	52,000	52,000	66 ^a	60 ^a	66 ^a	60 ^a	66	60

Notes

^a Cleanup level for this compound and this lithology is based on the background level in soil.

Source: Table 7-2 Summary of Selection of Preliminary Remediation Goals and Proposed Cleanup Levels for Non-Petroleum Compounds in Soil from Presidio-wide Cleanup Levels Document (EKI, 2003)

Although serpentinite was thought to be the predominant site lithology in the Work Plan, some RI soil samples collected were representative of beach/dune sand and Colma lithologies.

Table 7
Cleanup Levels for Metals in Soil
Barnard Avenue Protected Range
Small Arms Firing Ranges
Presidio of San Francisco, California

Potential Chemical of Concern	Protection of Human Health Residential Cleanup Level (mg/kg)		Protection of Ecological Receptors Buffer Zone Cleanup Level (mg/kg)		Protection of Ecological Receptors Special Status Species Cleanup Level (mg/kg)		Most Stringent Cleanup Level (mg/kg)	
	Beach/Dune Sand	Colma	Beach/Dune Sand	Colma	Beach/Dune Sand	Colma	Beach/Dune Sand	Colma
Inorganic Chemicals								
Antimony	29	29	5.0	5.0	5.0	5.0	5.0	5.0
Arsenic	5.9 ^a	6.2 ^a	64	64	10	10	5.9	6.2
Barium	5,000	5,000	500	500	320	320	320	320
Beryllium	140	140	10	10	10	10	10	10
Cadmium	1.7 ^a	1.7 ^a	1.7 ^a	0.8 ^a	1.7 ^a	0.8 ^a	1.7	0.8
Chromium	1,200	1,200	120 ^a	140 ^a	120 ^a	140 ^a	120	140
Cobalt	4,000	4,000	48	48	20	21 ^a	20	21
Copper	--	---	120	120	43a	49 ^a	43	49
Lead	400	400	300	300	160	160	160	160
Nickel	1,400	1,400	71	110 ^a	70	110 ^a	70	110
Selenium	360	360	1.1	1.1	0.75 ^a	0.5 ^a	0.75	0.5
Silver	360	360	2.0	2.0	2.0	2.0	2.0	2.0
Thallium	5.7	5.7	1.0	1.0	1.0 ^a	1.0	1.0	1.0
Vanadium	650	650	92 ^a	90 ^a	92 ^a	90 ^a	92	90
Zinc	22,000	22,000	66 ^a	60 ^a	66 ^a	60 ^a	66	60

Notes

^a Cleanup level for this compound and this lithology is based on the background level in soil.

Source: Table 7-2 Summary of Selection of Preliminary Remediation Goals and Proposed Cleanup Levels for Non-Petroleum Compounds in Soil from Presidio-wide Cleanup Levels Document (EKI, 2003)

Although Colma was thought to be the predominant site lithology in the Work Plan, some RI samples collected were also representative of the beach/dune sand lithology.

Table 8
Sampling and Analysis Program
Small Arms Firing Ranges
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Site	Site Investigation Exceedance Area	Sample Name	Sample Date	Sample Depth (feet)	Sample Type	Sampler Type	Lithology	5 Metals EPA 6010/6020	19 Metals EPA 6010/6020	Lead WET	Lead TCLP	Hold	Sieve
Lobos Creek Target Butt	Firing Line Grid												
	LCBSS01 LCBSS02 LCBSS03 LCBSS04 LCBSS05 LCBSS06 LCBSS07 LCBSS08 LCBSS12	LCBSB01[0.3]	7/31/2003	0.3	Primary	Hand-auger	Native		x				
		LCBSB01[1]	7/31/2003	1	Primary	Hand-auger	Native		x				
		LCBSB02[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		DUP072403D	7/24/2003	1.5	QC	Split-spoon	Dune Sand	x					
		LCBSB02[2.5]	7/24/2003	2.5	Primary	Split-spoon	Dune Sand	x					
		LCBSB03[1]	7/24/2003	1	Primary	Split-spoon	Fill	x					
		LCBSB03[2.5]	7/24/2003	2.5	Primary	Split-spoon	Dune Sand	x					
		LCBSB04[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB04[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB05[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB05[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB06[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB06[2]	7/24/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCBSB07[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand?		x				
		LCBSB07[2]	7/24/2003	2	Primary	Split-spoon	Dune Sand?	x					
		LCBSB08[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand?	x					
		LCBSB08[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand?	x					
		LCBSB09[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB09[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB10[0.5]	7/24/2003	0.5	Primary	Split-spoon	Dune Sand	x					
		LCBSB10[1.5]	7/24/2003	1.5	Primary	Split-spoon	Dune Sand	x					
		LCBSB11[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB11[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB12[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB12[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB13[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB13[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB14[0.3]	7/24/2003	0.3	Primary	Split-spoon	Fill/Dune Sand	x					
		LCBSB14[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB15[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB15[2]	7/24/2003	2	Primary	Split-spoon	Dune Sand	x					
		DUP072403C	7/24/2003	2.5	QC	Split-spoon	Dune Sand	x					
		LCBSB16[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB16[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB17[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB17[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB18[1]	7/30/2003	1	Primary	Hand-auger	Dune Sand	x					
		DUP073003E	7/30/2003	0.5	QC	Hand-auger	Dune Sand	x					
		LCBSB18[2]	7/30/2003	2	Primary	Hand-auger	Dune Sand		x				
		LCBSB19[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB19[2]	7/24/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCBSB20[1]	7/30/2003	1	Primary	Slide-hammer	Dune Sand	x					
		DUP07303D	7/30/2003	0.5	QC	Slide-hammer	Dune Sand	x					
		LCBSB20[2][MSD]	7/30/2003	2	Primary	Slide-hammer	Dune Sand	x					
	LCBBR61												
	LCBBR62												
	LCBBR64												
	LCBBR65												
	LCBBR66												
	LCBBR68												
	LCBBR69												
	LCBBR70												

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Site	Site Investigation Exceedance Area	Sample Name	Sample Date	Sample Depth (feet)	Sample Type	Sampler Type	Lithology	5 Metals EPA 6010/6020	19 Metals EPA 6010/6020	Lead WET	Lead TCLP	Hold	Sieve
Lobos Creek Target Butt (Continued)	LCBBR75 LCBBR78 LCBSS09 LCBSS10 LCBSS11 LCBBR63 LCBBR67 LCBBR76 LCBBR77 LCBBR80	LCBSB21[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		DUP072403A	7/24/2003	1.5	QC	Split-spoon	Dune Sand	x					
		LCBSB21[2]	7/24/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCBSB22[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB22[2]	7/31/2003	2	Primary	Hand-auger	Dune Sand	x					
		LCBSB23[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB23[2]	7/24/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCBSB24[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					x
		DUP072403B	7/24/2003	1.5	QC	Split-spoon	Dune Sand	x					
		LCBSB24[2.5]	7/24/2003	2.5	Primary	Split-spoon	Dune Sand	x					
		LCBSB25[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB25[2]	7/31/2003	2	Primary	Hand-auger	Dune Sand	x					
		LCBSB26[1][MSD]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB26[2]	7/31/2003	2	Primary	Hand-auger	Dune Sand	x					
		DUP073103C	7/31/2003	2.5	QC	Hand-auger	Dune Sand	x					
	Area Adjacent West of the Soil Berm												
	LCBBR71 LCBBR72 LCBBR73 LCBBR74	LCBSB27[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB27[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand		x				
		LCBSB28[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB28[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB29[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB29[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB30[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB30[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		DUP073103B	7/31/2003	1.5	QC	Hand-auger	Dune Sand	x					
		LCBSB31[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB31[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB32[0.3][MSD]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand		x				
		LCBSB32[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB33[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB33[2]	7/24/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCBSB34[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB34[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB35[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB35[2]	7/24/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCBSB36[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand	x					x
		LCBSB36[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					x
		DUP073103A	7/31/2003	1.5	QC	Hand-auger	Dune Sand	x					
		LCBSB37[0.3]	7/24/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCBSB37[1]	7/24/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCBSB38[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand		x				
		LCBSB38[1][MSD]	7/31/2003	1	Primary	Hand-auger	Dune Sand		x				
		LCBSB39[0.3]	7/30/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB39[1][MSD]	7/30/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB40[0.3]	7/30/2003	0.3	Primary	Hand-auger	Dune Sand		x				

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Lobos Creek Target Butt (Continued)		LCBSB40[1]	7/30/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCBSB41[0.3]	7/30/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB41[1]	7/30/2003	1	Primary	Hand-auger	Dune Sand	x					
		DUP073003C	7/30/2003	1.5	QC	Hand-auger	Dune Sand	x					
		LCBSB42[0.3]	7/30/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCBSB42[1]	7/30/2003	1	Primary	Hand-auger	Dune Sand	x					
Lobos Creek Protected Range	Adjacent Areas												
	LCRSS01 LCRSS02 LCRSS06 LCRSS07 LCRSS11 LCRSS12 LCRSS14	LCPSB01[0.3]	7/28/2003	0.3	Primary	Slide-hammer	Dune Sand	x					
		LCPSB01[1]	7/28/2003	1	Primary	Slide-hammer	Dune Sand		x				
		LCPSB02[0.3]	7/28/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCPSB02[1]	7/28/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB03[0.3]	7/28/2003	0.3	Primary	Slide-hammer	Dune Sand	x					
		LCPSB03[1]	7/28/2003	1	Primary	Slide-hammer	Dune Sand	x					
		LCPSB04[0.3]	7/28/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCPSB04[1]	7/28/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB05[0.3]	7/28/2003	0.3	Primary	Slide-hammer	Dune Sand	x					
		LCPSB05[1]	7/28/2003	1	Primary	Slide-hammer	Dune Sand	x					
		LCPSB06[0.3]	8/4/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCPSB06[1]	8/4/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB07[0.3]	8/4/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCPSB07[1]	8/4/2003	1	Primary	Hand-auger	Dune Sand	x					
	Adjacent Potential Backstops												
	East Hillside LCRSS69 through LCRSS77	LCPSB08[1]	8/1/2003	1	Primary	Hand-auger	Dune Sand	x					
		DUP080103B	8/1/2003	0.5	QC	Hand-auger	Dune Sand	x					
		LCPSB08[2]	8/1/2003	2	Primary	Hand-auger	Dune Sand	x					
		LCPSB09[1]	8/1/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB09[2]	8/1/2003	2	Primary	Hand-auger	Dune Sand	x					
		LCPSB10[1]	8/1/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB10[2][MSD]	8/1/2003	2	Primary	Hand-auger	Dune Sand	x					
		LCPSB11[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB11[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB12[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB12[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB13[1][MSD]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB13[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB14[1]	8/1/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB14[2]	8/1/2003	2	Primary	Hand-auger	Dune Sand	x					
		DUP080103A	8/1/2003	2.5	QC	Hand-auger	Dune Sand	x					
		LCPSB15[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		DUP073103E	7/31/2003	0.5	QC	Hand-auger	Dune Sand	x					
		LCPSB15[2]	7/31/2003	2	Primary	Hand-auger	Dune Sand	x					
		LCPSB16[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB16[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB17[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB17[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					

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Lobos Creek Protected Range (Continued)	Northwest Hillside #1 LCRSS15 through LCRSS18	LCPSB18[0.3]	7/23/2003	0.3	Primary	Split-spoon	Dune Sand	x					x
		LCPSB18[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB19[0.3]	7/23/2003	0.3	Primary	Split-spoon	Dune Sand	x					
		LCPSB19[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB20[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand		x				
		LCPSB20[2.5]	7/23/2003	2.5	Primary	Split-spoon	Dune Sand	x					
		LCPSB21[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand		x				
		LCPSB21[2.5]	7/23/2003	2.5	Primary	Split-spoon	Dune Sand	x					
		LCPSB22[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB22[2]	7/31/2003	2	Primary	Hand-auger	Dune Sand					x	
		LCPSB23[0.3]	7/31/2003	0.3	Primary	Hand-auger	Fill					x	
		LCPSB23[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
		DUP073103D	7/31/2003	1.5	QC	Hand-auger	Dune Sand						
		LCPSB24[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB24[2.5]	7/23/2003	2.5	Primary	Split-spoon	Dune Sand	x					
		LCPSB25[1.5]	7/23/2003	1.5	Primary	Split-spoon	Dune Sand	x					
		LCPSB25[2.5]	7/23/2003	2.5	Primary	Split-spoon	Dune Sand	x					
		LCPSB26[0.3]	7/31/2003	0.3	Primary	Hand-auger	Dune Sand	x					
		LCPSB26[1]	7/31/2003	1	Primary	Hand-auger	Dune Sand	x					
	Northwest Hillside #2 LCRBR60 through LCRBR68 LCRSS19	LCPSB27[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					x
		LCPSB27[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB28[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB28[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB29[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB29[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB30[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB30[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB31[1]	8/4/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB31[2]	8/4/2003	2	Primary	Hand-auger	Dune Sand	x					
		LCPSB32[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB32[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB33[1]	8/4/2003	1	Primary	Hand-auger	Dune Sand	x					
		LCPSB33[2]	8/4/2003	2	Primary	Hand-auger	Dune Sand	x					
		DUP080403A	8/4/2003	2.5	QC	Hand-auger	Dune Sand	x					
		LCPSB34[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB34[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		DUP072303A	7/23/2003	1.5	QC	Split-spoon	Dune Sand	x					
		LCPSB35[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand		x				
		LCPSB35[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB36[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand	x					
		LCPSB36[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand	x					
		LCPSB37[1]	7/23/2003	1	Primary	Split-spoon	Dune Sand		x				x
		LCPSB37[2]	7/23/2003	2	Primary	Split-spoon	Dune Sand		x				
		DUP072303B	7/23/2003	1.5	QC	Split-spoon	Dune Sand		x				

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Machine Gun Butt	Adjacent												
	637BR60 through 637BR72	MGBSB01	7/21/2003	Refusal at 1'		--	--	--	--				
		MGBSB02[1]	7/22/2003	1	Primary	Slide-hammer	Colma	x					
		MGBSB02[2]	7/22/2003	2	Primary	Slide-hammer	Native	x					
		MGBSB03[1]	7/22/2003	1	Primary	Slide-hammer	Colma Sand	x					
		MGBSB03[2]	7/22/2003	2	Primary	Slide-hammer	Colma Sand	x					
		MGBSB04[1]	7/22/2003	1	Primary	Slide-hammer	Colma Sand	x					
		DUP072203A	7/22/2003	1.5	QC	Slide-hammer	Colma Sand	x					
		MGBSB04[2]	7/22/2003	2	Primary	Slide-hammer	Colma Sand	x					
		MGBSB05[1]	7/22/2003	1	Primary	Slide-hammer	Colma Sand	x					
		MGBSB05[2]	7/22/2003	2	Primary	Slide-hammer	Colma Sand	x					
		MGBSB06[1]	7/22/2003	1	Primary	Slide-hammer	Native		x				
		MGBSB06[2]	7/22/2003	2	Primary	Slide-hammer	Native	x					
	South Hillside												
		MGBSB07[1]	7/22/2003	1	Primary	Slide-hammer	Dune Sand	x					
		MGBSB07[2]	7/22/2003	2	Primary	Slide-hammer	Dune Sand	x					
		MGBSB08[1]	7/22/2003	1	Primary	Slide-hammer	Dune Sand	x					
		MGBSB08[2]	7/22/2003	2	Primary	Slide-hammer	Dune Sand	x					
		MGBSB09[1]	7/22/2003	1	Primary	Slide-hammer	Dune Sand	x					
		MGBSB09[2]	7/22/2003	2	Primary	Slide-hammer	Dune Sand	x					
		MGBSB10[1]	7/22/2003	1	Primary	Slide-hammer	Dune Sand	x					
		MGBSB10[2]	7/22/2003	2	Primary	Slide-hammer	Dune Sand	x					
		MGBSB11[1]	7/21/2003	1	Primary	Slide-hammer	Native	x					
		MGBSB11[2]	7/21/2003	2	Primary	Slide-hammer	Native	x					
		MGBSB12[1]	7/21/2003	1	Primary	Slide-hammer	Dune Sand	x					
		MGBSB12[2]	7/21/2003	2	Primary	Slide-hammer	Dune Sand	x					
		MGBSB13[1]	7/21/2003	1	Primary	Slide-hammer	Colma Sand	x					
		MGBSB13	7/21/2003	--	Primary	Refusal at 1.7'	Colma Sand						
		MGBSB14[0.5]	7/21/2003	0.5	Primary	Slide-hammer	Native	x					
		MGBSB14[1]	7/21/2003	1	Primary	Slide-hammer	Native	x					
		MGBSB15[1]	7/21/2003	1	Primary	Slide-hammer	Colma Sand	x					
		MGBSB15	7/21/2003	--	Primary	Refusal at 1.5'	Colma Sand						
		MGBSB16[1]	7/21/2003	1	Primary	Slide-hammer	Colma Sand		x				
		MGBSB16[2]	7/21/2003	2	Primary	Slide-hammer	Colma Sand	x					
		MGBSB17[1]	7/21/2003	1	Primary	Slide-hammer	Colma Sand	x					
		MGBSB17[2]	7/21/2003	2	Primary	Slide-hammer	Colma Sand	x					
		MGBSB18[1]	7/21/2003	1	Primary	Slide-hammer	Colma Sand	x					
		MGBSB18[2]	7/21/2003	2	Primary	Slide-hammer	Colma Sand	x					
		MGBSB19[0.3]	7/21/2003	0.3	Primary	Slide-hammer	Colma Sand	x					x
		MGBSB19	7/21/2003	--	Primary	Not sampled due to tree roots							

Table 8
Sampling and Analysis Program
Small Arms Firing Ranges
Presidio of San Francisco, California

Site	Site Investigation Exceedance Area	Sample Name	Sample Date	Sample Depth (feet)	Sample Type	Sampler Type	Lithology	5 Metals EPA 6010/6020	19 Metals EPA 6010/6020	Lead WET	Lead TCLP	Hold	Sieve
California Highway Patrol	Isolated												
	CHPSS07	CHPSB01[0.3]	7/30/2003	0.3	Primary	Hand-auger	Fill/Colma Mix	x					
		CHPSB01[1]	7/30/2003	1	Primary	Hand-auger	Colma	x					
		CHPSB01[2]	7/30/2003	2	Primary	Hand-auger	Colma	x					
		CHPSB02[0.3]	7/30/2003	0.3	Primary	Hand-auger	Colma		x	x			
		CHPSB02[1]	7/30/2003	1	Primary	Hand-auger	Colma	x					
		CHPSB02[2][MSD]	7/30/2003	2	Primary	Hand-auger	Colma	x					
		CHPSB03[0.3]	7/30/2003	0.3	Primary	Hand-auger	Colma	x		x			
		CHPSB03[1]	7/30/2003	1	Primary	Hand-auger	Colma	x					
		CHPSB03[2]	7/30/2003	2	Primary	Hand-auger	Colma	x					
		DUP073003B	7/30/2003	2.5	QC	Hand-auger	Colma	x					
	In the Backstop												
		CHPSB04	7/29/2003	--	Primary	Refusal at 10" (possibly bunker)							
		CHPSB05[1]	7/29/2003	1	Primary	Hand-auger	Colma	x		x	x		x
		CHPSB05	7/29/2003	--	Primary	Refusal at 2'							
		CHPSB06[1]	7/29/2003	1	Primary	Hand-auger	Colma	x		x	x		x
		CHPSB06[2]	7/29/2003	2	Primary	Hand-auger	Colma	x					
		CHPSB06[3]	7/29/2003	3	Primary	Hand-auger	Colma	x					
		CHPSB07[1]	7/29/2003	1	Primary	Hand-auger	Colma	x		x	x		x
		CHPSB07[2]	7/29/2003	2	Primary	Hand-auger	Colma	x		x			x
		CHPSB07[3]	7/29/2003	3	Primary	Hand-auger	Colma	x		x			x
		DUP072903A	7/29/2003	2.5	QC	Hand-auger	Colma	x					
		CHPSB08[1]	7/29/2003	1	Primary	Hand-auger	Colma		x				
		CHPSB08[2]	7/29/2003	2	Primary	Hand-auger	Colma	x					
		CHPSB08	7/29/2003		Primary	Refusal at 2.5' (possibly bunker)							
		CHPSB09[2]	7/29/2003	2	Primary	Hand-auger	Native	x					
		DUP072903D	7/29/2003	1.5	QC	Hand-auger	Native	x					
		CHPSB09[3]	7/29/2003	3	Primary	Hand-auger	Dune Sand		x				
		CHPSB09[4]	7/29/2003	4	Primary	Hand-auger	Dune Sand		x				
		CHPSB10[2]	7/29/2003	2	Primary	Hand-auger	Dune Sand		x				
		DUP072903A	7/29/2003	2.5	QC	Hand-auger	Dune Sand		x				
		CHPSB10[3]	7/29/2003	3	Primary	Hand-auger	Dune Sand	x					
		CHPSB10[4]	7/29/2003	4	Primary	Hand-auger	Dune Sand	x					
	Adjacent												
	Around the Former Backstop CHPSS04 CHPSS08 CHPBR77 CHPBR78 CHPBR79	CHPSB11[1]	7/30/2003	1	Primary	Hand-auger	Colma?	x					
		DUP073003A	7/30/2003	1	QC	Hand-auger	Colma?	x					
		CHPSB11[2]	7/30/2003	2	Primary	Hand-auger	Colma?	x					
		CHPSB11[3][MSD]	7/30/2003	3	Primary	Hand-auger	Colma?	x					
		CHPSB12[1]	7/30/2003	1	Primary	Hand-auger	Colma?	x					
		CHPSB12[2]	7/30/2003	2	Primary	Hand-auger	Colma?		x				
		CHPSB12[3]	7/30/2003	3	Primary	Hand-auger	Colma?		x				
		CHPSB13[1]	7/30/2003	1	Primary	Hand-auger	Native	x					
		CHPSB13[2]	7/30/2003	2	Primary	Hand-auger	Colma	x					
		CHPSB13[3]	7/30/2003	3	Primary	Hand-auger	Colma	x					
		CHPSB14[1]	7/29/2003	1	Primary	Hand-auger	Colma?	x					

Table 8
Sampling and Analysis Program
Small Arms Firing Ranges
Presidio of San Francisco, California

Site	Site Investigation Exceedance Area	Sample Name	Sample Date	Sample Depth (feet)	Sample Type	Sampler Type	Lithology	5 Metals EPA 6010/6020	19 Metals EPA 6010/6020	Lead WET	Lead TCLP	Hold	Sieve
California Highway Patrol (Continued)		CHPSB14[2]	7/29/2003	2	Primary	Hand-auger	Colma?	x					
		CHPSB14[3]	7/29/2003	3	Primary	Hand-auger	Colma?	x					
		CHPSB15[1]	7/29/2003	1	Primary	Hand-auger	Fill?	x					
		CHPSB15[2]	7/29/2003	2	Primary	Hand-auger	Fill?	x					
		CHPSB15[3]	7/29/2003	3	Primary	Hand-auger	Colma?	x					
		CHPSB16[0.3]	7/29/2003	0.3	Primary	Hand-auger	Colma?	x					
		CHPSB16[1]	7/29/2003	1	Primary	Hand-auger	Colma?	x					
		CHPSB16[2]	7/29/2003	2	Primary	Hand-auger	Colma?	x					
		DUP072903C	7/29/2003	1.5	QC	Hand-auger	Colma?	x					
		CHPSB17[2]	7/29/2003	2	Primary	Hand-auger	Colma	x					
		CHPSB17[3]	7/29/2003	3	Primary	Hand-auger	Colma	x					
		CHPSB18[0.3]	7/29/2003	0.3	Primary	Hand-auger	Colma	x					
		CHPSB18[1]	7/29/2003	1	Primary	Hand-auger	Colma	x					
		CHPSB18[2]	7/29/2003	2	Primary	Hand-auger	Colma	x					
		CHPSB19[2]	7/29/2003	2	Primary	Hand-auger	Fill?/Dune Sand		x				
		CHPSB19[3]	7/29/2003	3	Primary	Hand-auger	Dune Sand	x					
		CHPSB19[4]	7/29/2003	4	Primary	Hand-auger	Dune Sand		x				
		CHPSB20[1]	7/29/2003	1	Primary	Hand-auger	Native	x					
		CHPSB20[2]	7/29/2003	2	Primary	Hand-auger	Dune Sand	x					
		CHPSB20[3]	7/29/2003	3	Primary	Hand-auger	Dune Sand	x					
	Paved Area	CHPSB21[0.3]	7/25/2003	0.3	Primary	Split-spoon	Native	x					
		CHPSB21[1]	7/25/2003	1	Primary	Split-spoon	Colma?	x					
		CHPSB21[2.5]	7/25/2003	2.5	Primary	Split-spoon	Colma?	x					
		CHPSB22[0.3]	7/25/2003	0.3	Primary	Split-spoon	Colma?		x				
		CHPSB22[1]	7/25/2003	1	Primary	Split-spoon	Colma?	x					
		CHPSB22[2.5]	7/25/2003	2.5	Primary	Split-spoon	Colma?	x					
		CHPSB23[0.3]	7/25/2003	0.3	Primary	Split-spoon	Colma?	x					x
		CHPSB23[1]	7/25/2003	1	Primary	Split-spoon	Colma?	x					
		CHPSB23[2.5]	7/25/2003	2.5	Primary	Split-spoon	Colma?	x					
		CHPSB24[0.3]	7/25/2003	0.3	Primary	Split-spoon	Colma/Fill	x					x
		CHPSB24[1]	7/25/2003	1	Primary	Split-spoon	Colma	x					
		CHPSB24[2.5]	7/25/2003	2.5	Primary	Split-spoon	Colma	x					
		CHPSB25[1]	7/25/2003	1	Primary	Split-spoon	Colma?		x				
		DUP072503A	7/25/2003	0.5	QC	Split-spoon	Colma?		x				
		CHPSB25[2]	7/25/2003	2	Primary	Split-spoon	Colma?	x					
		CHPSB25[3]	7/25/2003	3	Primary	Split-spoon	Colma?	x					
		CHPSB26[1]	7/25/2003	1	Primary	Split-spoon	Native	x					
		CHPSB26[3]	7/25/2003	3	Primary	Split-spoon	Native	x					
		CHPSB26[3.5]	7/25/2003	3.5	Primary	Split-spoon	Colma					x	
		CHPSB27[1]	7/29/2003	1	Primary	Split-spoon	Colma?	x					
		CHPSB27[2][MSD]	7/29/2003	2	Primary	Split-spoon	Colma?	x					
		CHPSB27[3]	7/29/2003	3	Primary	Split-spoon	Colma?	x					

Table 8
Sampling and Analysis Program
Small Arms Firing Ranges
Presidio of San Francisco, California

Site	Site Investigation Exceedance Area	Sample Name	Sample Date	Sample Depth (feet)	Sample Type	Sampler Type	Lithology	5 Metals EPA 6010/6020	19 Metals EPA 6010/6020	Lead WET	Lead TCLP	Hold	Sieve
Barnard Avenue Protected Range	Northern End of Range Grid	BAPSB01[1]	7/25/2003	1	Primary	Split-spoon	Fill					x	
		BAPSB01[3.5]	7/25/2003	3.5	Primary	Split-spoon	Fill					x	
		BAPSB01[4.5][MSD]	7/25/2003	4.5	Primary	Split-spoon	Native	x					
		BAPSB01[5.5]	7/25/2003	5.5	Primary	Split-spoon	Native	x					
		BAPSB02[1]	7/25/2003	1	Primary	Split-spoon	Fill					x	
		BAPSB02[3]	7/25/2003	3	Primary	Split-spoon	Native	x					
		DUP072503B	7/25/2003	3.5	QC	Split-spoon	Native	x					
		BAPSB02[5.5]	7/25/2003	5.5	Primary	Split-spoon	Native	x					
		BAPSB03[0.3]	7/28/2003	0.3	Primary	Slide-hammer	Fill					x	
		BAPSB03[1]	7/28/2003	1	Primary	Slide-hammer	Fill					x	
		BAPSB03R[5.5]	8/1/2003	5.5	Primary	Split-spoon	Native	x		x			x
		BAPSB03R[6]	8/1/2003	6	Primary	Split-spoon	Native					x	
		BAPSB03R[6.5]	8/1/2003	6.5	Primary	Split-spoon	Native	x					
		BAPSB04[1][MSD]	8/1/2003	1	Primary	Split-spoon	Colma	x					
		DUP080103D	8/1/2003	3.5	QC	Split-spoon	Colma	x					
		BAPSB04[3]	8/1/2003	3	Primary	Split-spoon	Colma	x					
		BAPSB05[0.3]	7/25/2003	0.3	Primary	Split-spoon	Fill					x	
		BAPSB05[1]	7/25/2003	1	Primary	Split-spoon	Fill					x	
		BAPSB05[3]	7/25/2003	3	Primary	Split-spoon	Fill					x	
		BAPSB05[3.5]	7/25/2003	3.5	Primary	Envirocore	Fill					x	
		BAPSB05[7][MSD]	8/1/2003	7	Primary	Envirocore	Native	x					
		DUP080103F	8/1/2003	7.5	QC	Envirocore	Native	x					
		BAPSB05[8.5]	8/1/2003	8.5	Primary	Envirocore	Native	x					
		BAPSB06[1]	7/25/2003	1	Primary	Split-spoon	Fill					x	
		BAPSB06[3]	7/25/2003	3	Primary	Split-spoon	Fill					x	
		BAPSB06[5.5]	7/25/2003	5.5	Primary	Split-spoon	Native	x					
		BAPSB07[5.5]	8/1/2003	5.5	Primary	Envirocore	Native	x					
		BAPSB07	8/1/2003	--	Primary	Refusal at 8.5'							
		BAPSB08[0.3]	7/28/2003	0.3	Primary	Slide-hammer	Fill					x	
		BAPSB08R[6.5]	8/1/2003	6.5	Primary	Envirocore	Native	x					
		BAPSB08R[7.5]	8/1/2003	7.5	Primary	Envirocore	Native	x					
		BAPSB09[0.3]	7/25/2003	0.3	Primary	Split-spoon	Native	x					
		BAPSB09[1]	7/25/2003	1	Primary	Split-spoon	Native	x					
		BAPSB10[1][MSD]	8/1/2003	1	Primary	Split-spoon	Native		x				
		BAPSB10[2]	8/1/2003	2	Primary	Split-spoon	Native	x					
		BAPSB11[1]	7/25/2003	1	Primary	Split-spoon	Fill					x	
		BAPSB11[2]	7/25/2003	2	Primary	Split-spoon	Native	x					
		BAPSB11[3]	8/1/2003	3	Primary	Envirocore	Native	x					
		BAPSB12[1]	8/1/2003	1	Primary	Split-spoon	Dune Sand		x				
		DUP080103C	8/1/2003	1.5	QC	Split-spoon	Dune Sand		x				
		BAPSB12[3]	8/1/2003	3	Primary	Split-spoon	Dune Sand	x					
		BAPSB13[0.3]	7/28/2003	0.3	Primary	Slide-hammer	Native		x				x
		BAPSB13[1]	7/28/2003	1	Primary	Slide-hammer	Native		x				

Table 8
Sampling and Analysis Program
Small Arms Firing Ranges
Presidio of San Francisco, California

Site	Site Investigation Exceedance Area	Sample Name	Sample Date	Sample Depth (feet)	Sample Type	Sampler Type	Lithology	5 Metals EPA 6010/6020	19 Metals EPA 6010/6020	Lead WET	Lead TCLP	Hold	Sieve
Barnard Avenue Protected Range (Continued)		BAPSB14[0.3]	7/28/2003	0.3	Primary	Slide-hammer	Native	x					
		BAPSB14[1][MSD]	7/28/2003	1	Primary	Slide-hammer	Native	x					
		BAPSB15[0.3]	7/25/2003	0.3	Primary	Split-spoon	Native	x					
		BAPSB15[1]	7/25/2003	1	Primary	Split-spoon	Native	x					
		BAPSB16[0.3][MSD]	8/1/2003	0.3	Primary	Split-spoon	Native	x					
		BAPSB16[1]	8/1/2003	1	Primary	Split-spoon	Native	x					
		DUP080103E	8/1/2003	1.5	QC	Split-spoon	Native	x					
		BAPSB17[0.3][MSD]	7/28/2003	0.3	Primary	Slide-hammer	Native	x					
		BAPSB17[1]	7/28/2003	1.5	Primary	Slide-hammer	Native	x					
		DUP072803A	7/28/2003	1	QC	Slide-hammer	Native	x					
QC Samples		BAPSB18[0.3]	7/28/2003	0.3	Primary	Slide-hammer	Native	x					x
		BAPSB18[1]	7/28/2003	1	Primary	Slide-hammer	Native	x					
		BAPSB02[1]RB[3]	07/25/03		QC			x					
		BAPSB10[1]RB[2]	08/01/03		QC			x					
		CHPSB07[1]RB[2]	07/29/03		QC			x					
		LCBSB03[1]RB[2.5]	07/24/03		QC			x					
		LCBSB12[0.3]RB[1]	07/31/03		QC			x					
		LCBSB41[0.3]RB[1]	07/30/03		QC			x					
		LCPSB[1]RB[2]	08/04/03		QC			x					
		LCPSB03[0.3]RB[1]	07/28/03		QC			x					
		LCPSB21RBLCP SB20	07/23/03		QC				x				
		MGBSB02[1]RB[2]	07/22/03		QC			x					
		MGBSB11RBMGBSB06	07/21/03		QC			x					
		DW072503A	07/25/03		QC				x				
		DW073103	07/31/03		QC				x				

Notes

DUP prefix indicates a blind duplicate sample.

DW - source water sample

MSD - matrix spike/matrix spike duplicate

RB - equipment rinsate blank sample

QC - Quality Control sample

Sieve - Samples sieved in laboratory for presence of bullet and ammunition fragments

TCLP - Toxicity Characteristic Leaching Procedure Test Method

WET - California Waste Extraction Test

5 Metals include Antimony, Barium, Cadmium, Copper, Lead and Zinc

19 Metals include Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Nickel, Selenium, Silver, Thallium, Vanadium, and Zinc

Table 9
Summary of QA/QC Sample Results
Small Arms Firing Ranges
Presidio of San Francisco, California

		Aluminum µg/L	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Cadmium µg/L	Chromium µg/L	Cobalt µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Magnesium µg/L	Manganese µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Thallium µg/L	Vanadium µg/L	Zinc µg/L
	Analytical Method	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010	SW6010
Sample Name	Sample Date																			
BAPSB02[1]RB[3]	07/25/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
BAPSB10[1]RB[2]	08/01/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
CHPSB07[1]RB[2]	07/29/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
LCBSB03[1]RB[2.5]	07/24/03	NA	< 60	NA	< 10	NA	NA	NA	NA	18	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
LCBSB12[0.3]RB[1]	07/31/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
LCBSB41[0.3]RB[1]	07/30/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
LCPSB[1]RB[2]	08/04/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
LCPSB03[0.3]RB[1]	07/28/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
LCPSB21RBLCP SB20	07/23/03	< 100	< 60	< 5	< 10	< 2	< 5	< 10	< 20	< 10	560	< 3	< 500	< 10	< 20	< 5	< 5	< 5	< 10	< 20
MGBSB02[1]RB[2]	07/22/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	54
MGBSB11RBMGBSB06	07/21/03	NA	< 60	NA	< 10	NA	NA	NA	NA	< 10	NA	< 3	NA	NA	NA	NA	NA	NA	NA	< 20
DW072503A	07/25/03	< 100	< 60	< 5	< 10	< 2	< 5	< 10	< 20	190	140	< 3	690	< 10	< 20	< 5	< 5	< 5	< 10	25
DW073103	07/31/03	< 100	< 60	< 5	< 10	< 2	6.8	< 10	< 20	< 10	130	17	23000	25	< 20	< 5	< 5	< 5	< 10	600

Notes

µg/L - micrograms per liter
DW - Denotes source water sample
RB - Denotes equipment rinsate sample
NA - Not analyzed

Table 10
Summary of Metals Results in Soil
Lobos Creek Target Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analytical Method			SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020
Cleanup Level			NE	5	5.9	320	10	1.7	120	20	43	NE	160	NE	NE	70	0.75	2	1	92	66
Sample Name	Sample Date	Sample Depth (feet)																			
LCBSB01[0.3]	07/31/03	0.3	3,300	< 2.7 UJ	1.7	16 J-	0.16	0.66	23 J-	3.7 J-	3.2 J-	6,600	2.8 J-	1,600	97	19 J-	< 0.23 UJ	< 0.23	< 0.23 UJ	16 J-	14 J-
LCBSB01[1]	07/31/03	1	3,600	< 2.8 UJ	1.4	25 J-	0.17	0.95	23 J-	3.9 J-	4.4 J-	1,400	8.4 J-	1,600	120	18 J-	< 0.23 UJ	< 0.23	< 0.23 UJ	18 J-	17 J-
LCBSB02[1]	07/24/03	1	NA	< 3	NA	20	NA	NA	NA	NA	3.6	NA	3.2	NA	NA	NA	NA	NA	NA	NA	19
DUP072403D	07/24/03	1.5	NA	< 2.7 UJ	NA	23	NA	NA	NA	NA	4.7 J	NA	2.5	NA	NA	NA	NA	NA	NA	NA	20 J-
LCBSB02[2.5]	07/24/03	2.5	NA	< 2.9	NA	20	NA	NA	NA	NA	5.3	NA	2.2	NA	NA	NA	NA	NA	NA	NA	22
LCBSB03[1]	07/24/03	1	NA	< 2.7 UJ	NA	68	NA	NA	NA	NA	6.2 J	NA	4.3	NA	NA	NA	NA	NA	NA	NA	21 J-
LCBSB03[2.5]	07/24/03	2.5	NA	< 2.8 UJ	NA	38	NA	NA	NA	NA	8.9 J	NA	2.1	NA	NA	NA	NA	NA	NA	NA	23 J-
LCBSB04[0.3]	07/31/03	0.3	NA	< 3.4 UJ	NA	21	NA	NA	NA	NA	7.6	NA	29	NA	NA	NA	NA	NA	NA	NA	37
LCBSB04[1]	07/31/03	1	NA	< 3.1 UJ	NA	19	NA	NA	NA	NA	5.3	NA	64	NA	NA	NA	NA	NA	NA	NA	24
LCBSB05[0.3]	07/24/03	0.3	NA	< 2.9	NA	44	NA	NA	NA	NA	11	NA	13	NA	NA	NA	NA	NA	NA	NA	35
LCBSB05[1]	07/24/03	1	NA	< 3.1	NA	26	NA	NA	NA	NA	4.9	NA	8.5	NA	NA	NA	NA	NA	NA	NA	23
LCBSB06[1]	07/24/03	1	NA	< 2.9 UJ	NA	31	NA	NA	NA	NA	6.2 J	NA	1.5	NA	NA	NA	NA	NA	NA	NA	21 J-
LCBSB06[2]	07/24/03	2	NA	< 2.8 UJ	NA	30	NA	NA	NA	NA	5.6 J	NA	4.9	NA	NA	NA	NA	NA	NA	NA	21 J-
LCBSB07[1]	07/24/03	1	4,100	< 2.7	1.8	30	< 0.09	0.85	27	4.7	6.7	7,800	5.1	1,800	180	21	< 0.22	< 0.22	< 0.22	19	24
LCBSB07[2]	07/24/03	2	NA	< 2.6	NA	28	NA	NA	NA	NA	6.8	NA	3.8	NA	NA	NA	NA	NA	NA	NA	25
LCBSB08[0.3]	07/24/03	0.3	NA	< 2.7	NA	18	NA	NA	NA	NA	4.7	NA	22	NA	NA	NA	NA	NA	NA	NA	27
LCBSB08[1]	07/24/03	1	NA	< 2.9	NA	13	NA	NA	NA	NA	3.8	NA	2	NA	NA	NA	NA	NA	NA	NA	17
LCBSB09[0.3]	07/31/03	0.3	NA	< 3 UJ	NA	40	NA	NA	NA	NA	11	NA	23	NA	NA	NA	NA	NA	NA	NA	28
LCBSB09[1]	07/31/03	1	NA	< 2.7 UJ	NA	20	NA	NA	NA	NA	4.3	NA	5.6	NA	NA	NA	NA	NA	NA	NA	17
LCBSB10[0.5]	07/24/03	0.5	NA	< 2.8	NA	16	NA	NA	NA	NA	3.7	NA	3.4	NA	NA	NA	NA	NA	NA	NA	23
LCBSB10[1.5]	07/24/03	1.5	NA	< 3	NA	32	NA	NA	NA	NA	8.2	NA	6.7	NA	NA	NA	NA	NA	NA	NA	24
LCBSB11[0.3]	07/24/03	0.3	NA	< 2.9	NA	15	NA	NA	NA	NA	3.2	NA	3.7	NA	NA	NA	NA	NA	NA	NA	19
LCBSB11[1]	07/24/03	1	NA	< 2.9	NA	18	NA	NA	NA	NA	4.9	NA	1.8	NA	NA	NA	NA	NA	NA	NA	33
LCBSB12[0.3]	07/31/03	0.3	NA	< 2.7 UJ	NA	14	NA	NA	NA	NA	3.3	NA	6.2	NA	NA	NA	NA	NA	NA	NA	16
LCBSB12[1]	07/31/03	1	NA	< 2.6 UJ	NA	12	NA	NA	NA	NA	2.8	NA	5.4	NA	NA	NA	NA	NA	NA	NA	14
LCBSB13[0.3]	07/24/03	0.3	NA	< 2.5	NA	12	NA	NA	NA	NA	2.6	NA	0.74	NA	NA	NA	NA	NA	NA	NA	15
LCBSB13[1]	07/24/03	1	NA	< 2.7	NA	14	NA	NA	NA	NA	3.5	NA	4	NA	NA	NA	NA	NA	NA	NA	19
LCBSB14[0.3]	07/24/03	0.3	NA	< 2.3	NA	23	NA	NA	NA	NA	4.9	NA	5.4	NA	NA	NA	NA	NA	NA	NA	19
LCBSB14[1]	07/24/03	1	NA	< 3.6	NA	8.3	NA	NA	NA	NA	2.4	NA	3.7	NA	NA	NA	NA	NA	NA	NA	14
LCBSB15[1]	07/24/03	1	NA	< 2.9	NA	16	NA	NA	NA	NA	3.3	NA	4.1	NA	NA	NA	NA	NA	NA	NA	19
LCBSB15[2]	07/24/03	2	NA	< 3.2	NA	23	NA	NA	NA	NA	5.6	NA	5.7	NA	NA	NA	NA	NA	NA	NA	22
DUP072403C	07/24/03	2.5	NA	< 3.1	NA	14	NA	NA	NA	NA	3.3	NA	1.9	NA	NA	NA	NA	NA	NA	NA	17
LCBSB16[0.3]	07/24/03	0.3	NA	< 2.8	NA	16	NA	NA	NA	NA	3	NA	3.8	NA	NA	NA	NA	NA	NA	NA	23
LCBSB16[1]	07/24/03	1	NA	< 2.6	NA	15	NA	NA	NA	NA	3.3	NA	3.8	NA	NA	NA	NA	NA	NA	NA	18
LCBSB17[0.3]	07/31/03	0.3	NA	< 2.8 UJ	NA	17	NA	NA	NA	NA	4.9	NA	21 J+	NA	NA	NA	NA	NA	NA	NA	25
LCBSB17[1]	07/31/03	1	NA	< 2.8 UJ	NA	12	NA	NA	NA	NA	3.3	NA	7.6 J+	NA	NA	NA	NA	NA	NA	NA	22
LCBSB18[1]	07/30/03	1	NA	< 2.9 UJ	NA	12	NA	NA	NA	NA	3.2	NA	28 J+	NA	NA	NA	NA	NA	NA	NA	16
DUP073003E	07/30/03	0.5	NA	< 3 UJ	NA	11	NA	NA	NA	NA	3.6	NA	23 J+	NA	NA	NA	NA	NA	NA	NA	16
LCBSB18[2]	07/30/03	2	3,500	< 2.3 UJ	1.9	11	0.25	0.64	23	3.1	1.9	6,600	6.1	1,400 J-	83 J-	16	< 0.19	< 0.19	< 0.19	16	11
LCBSB19[1]	07/24/03	1	NA	< 2.9 UJ	NA	8.4	NA	NA	NA	NA	3.1 J+	NA	8.4	NA	NA	NA	NA	NA	NA	NA	13
LCBSB19[2]	07/24/03	2	NA	< 2.8 UJ	NA	7.2	NA	NA	NA	NA	1.9 J+	NA	0.51	NA	NA	NA	NA	NA	NA	NA	9.8

Table 10
Summary of Metals Results in Soil
Lobos Creek Target Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analytical Method			SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020
Cleanup Level			NE	5	5.9	320	10	1.7	120	20	43	NE	160	NE	NE	70	0.75	2	1	92	66
Sample Name	Sample Date	Sample Depth (feet)																			
LCBSB20[1]	07/30/03	1	NA	< 3 UJ	NA	13	NA	NA	NA	NA	3.8	NA	23 J+	NA	NA	NA	NA	NA	NA	NA	16
DUP073003D	07/30/03	0.5	NA	< 2.7 UJ	NA	11	NA	NA	NA	NA	3.1	NA	19 J+	NA	NA	NA	NA	NA	NA	NA	13
LCBSB20[2][MSD]	07/30/03	2	NA	< 2.3 UJ	NA	9.8	NA	NA	NA	NA	2.7	NA	14 J+	NA	NA	NA	NA	NA	NA	NA	12
LCBSB21[1]	07/24/03	1	NA	< 2.8 UJ	NA	14	NA	NA	NA	NA	3.2 J+	NA	5.9	NA	NA	NA	NA	NA	NA	NA	17
DUP072403A	07/24/03	1.5	NA	< 2.7 UJ	NA	15	NA	NA	NA	NA	5.2 J+	NA	27	NA	NA	NA	NA	NA	NA	NA	18
LCBSB21[2]	07/24/03	2	NA	< 2.9 UJ	NA	13	NA	NA	NA	NA	4.3 J+	NA	20	NA	NA	NA	NA	NA	NA	NA	17
LCBSB22[1]	07/31/03	1	NA	< 3.1 UJ	NA	14	NA	NA	NA	NA	6.7	NA	28	NA	NA	NA	NA	NA	NA	NA	17
LCBSB22[2]	07/31/03	2	NA	< 2.6 UJ	NA	10	NA	NA	NA	NA	3.8	NA	17	NA	NA	NA	NA	NA	NA	NA	13
LCBSB23[1]	07/24/03	1	NA	< 2.7 UJ	NA	12	NA	NA	NA	NA	3.5	NA	0.71	NA	NA	NA	NA	NA	NA	NA	12 J+
LCBSB23[2]	07/24/03	2	NA	< 2.8 UJ	NA	12	NA	NA	NA	NA	1.9	NA	0.26	NA	NA	NA	NA	NA	NA	NA	11 J+
LCBSB24[1]	07/24/03	1	NA	< 2.7 UJ	NA	110	NA	NA	NA	NA	56	NA	6.2	NA	NA	NA	NA	NA	NA	NA	17 J+
DUP072403B	07/24/03	1.5	NA	< 3.5 UJ	NA	21	NA	NA	NA	NA	3.1	NA	0.48	NA	NA	NA	NA	NA	NA	NA	19 J+
LCBSB24[2.5]	07/24/03	2.5	NA	< 2.7 UJ	NA	13	NA	NA	NA	NA	2.2	NA	0.23	NA	NA	NA	NA	NA	NA	NA	13 J+
LCBSB25[1]	07/31/03	1	NA	< 3 UJ	NA	17	NA	NA	NA	NA	4.9	NA	34	NA	NA	NA	NA	NA	NA	NA	21 J-
LCBSB25[2]	07/31/03	2	NA	< 2.9 UJ	NA	19	NA	NA	NA	NA	6.5	NA	49	NA	NA	NA	NA	NA	NA	NA	27 J-
LCBSB26[1][MSD]	07/31/03	1	NA	< 2.9 UJ	NA	12	NA	NA	NA	NA	3.6	NA	5.8	NA	NA	NA	NA	NA	NA	NA	15 J-
LCBSB26[2]	07/31/03	2	NA	< 2.4 UJ	NA	12	NA	NA	NA	NA	2.3	NA	2.1	NA	NA	NA	NA	NA	NA	NA	13 J-
DUP073103C	07/31/03	2.5	NA	< 2.9 UJ	NA	10	NA	NA	NA	NA	2.1	NA	1.9	NA	NA	NA	NA	NA	NA	NA	12 J-
LCBSB27[0.3]	07/24/03	0.3	NA	< 2.7 UJ	NA	10	NA	NA	NA	NA	2.2	NA	0.62	NA	NA	NA	NA	NA	NA	NA	13 J+
LCBSB27[1]	07/24/03	1	3,400	< 2.8 UJ	2.4	9.5	0.14	0.81	23	3.9	2.2	7,100	0.56	1,800	93	21	< 0.23	< 0.23	< 0.23	16	12 J+
LCBSB28[0.3]	07/24/03	0.3	NA	< 3 UJ	NA	9	NA	NA	NA	NA	2.3	NA	2.7	NA	NA	NA	NA	NA	NA	NA	14 J+
LCBSB28[1]	07/24/03	1	NA	< 2.8 UJ	NA	10	NA	NA	NA	NA	2.2	NA	0.76	NA	NA	NA	NA	NA	NA	NA	12 J+
LCBSB29[0.3]	07/24/03	0.3	NA	< 3 UJ	NA	8.4	NA	NA	NA	NA	2.3	NA	2.1	NA	NA	NA	NA	NA	NA	NA	13 J+
LCBSB29[1]	07/24/03	1	NA	< 2.9 UJ	NA	7.7	NA	NA	NA	NA	2.5	NA	0.69	NA	NA	NA	NA	NA	NA	NA	11 J+
LCBSB30[0.3]	07/31/03	0.3	NA	< 2.9 UJ	NA	29	NA	NA	NA	NA	11	NA	8.5	NA	NA	NA	NA	NA	NA	NA	18 J-
LCBSB30[1]	07/31/03	1	NA	< 2.8 UJ	NA	29	NA	NA	NA	NA	9.3	NA	7.8	NA	NA	NA	NA	NA	NA	NA	18 J-
DUP073103B	07/31/03	1.5	NA	< 2.6 UJ	NA	17	NA	NA	NA	NA	4.9	NA	3.7	NA	NA	NA	NA	NA	NA	NA	13 J-
LCBSB31[0.3]	07/24/03	0.3	NA	< 2.9 UJ	NA	12	NA	NA	NA	NA	4.6	NA	26	NA	NA	NA	NA	NA	NA	NA	19 J+
LCBSB31[1]	07/24/03	1	NA	< 2.7 UJ	NA	15	NA	NA	NA	NA	5	NA	27	NA	NA	NA	NA	NA	NA	NA	17 J+
LCBSB32[0.3][MSD]	07/24/03	0.3	4,100	< 2.9 UJ	2.7	17	< 0.097	1.3	30	4.2	5.6	10,000	33	1,800	130	21	0.69	< 0.24	< 0.24	21	55 J+
LCBSB32[1]	07/24/03	1	NA	< 2.6 UJ	NA	14	NA	NA	NA	NA	2.1	NA	2.7	NA	NA	NA	NA	NA	NA	NA	22 J+
LCBSB33[1]	07/24/03	1	NA	< 2.9 UJ	NA	40	NA	NA	NA	NA	19	NA	9.8	NA	NA	NA	NA	NA	NA	NA	14 J+
LCBSB33[2]	07/24/03	2	NA	< 2.8 UJ	NA	74	NA	NA	NA	NA	26	NA	23	NA	NA	NA	NA	NA	NA	NA	24 J+
LCBSB34[0.3]	07/31/03	0.3	NA	< 3 UJ	NA	15	NA	NA	NA	NA	4.5	NA	20	NA	NA	NA	NA	NA	NA	NA	26 J-
LCBSB34[1]	07/31/03	1	NA	< 2.8 UJ	NA	14	NA	NA	NA	NA	4.1	NA	22	NA	NA	NA	NA	NA	NA	NA	27 J-
LCBSB35[1]	07/24/03	1	NA	< 3 UJ	NA	17	NA	NA	NA	NA	6.7 J+	NA	21	NA	NA	NA	NA	NA	NA	NA	15
LCBSB35[2]	07/24/03	2	NA	< 2.9 UJ	NA	82	NA	NA	NA	NA	34	NA	19	NA	NA	NA	NA	NA	NA	NA	27 J+
LCBSB36[0.3]	07/31/03	0.3	NA	< 2.6 UJ	NA	23	NA	NA	NA	NA	8.3	NA	38 J+	NA	NA	NA	NA	NA	NA	NA	94
LCBSB36[1]	07/31/03	1	NA	< 2.7 UJ	NA	20	NA	NA	NA	NA	6.7	NA	25 J+	NA	NA	NA	NA	NA	NA	NA	70
DUP073103A	07/31/03	1.5	NA	< 2.6 UJ	NA	14	NA	NA	NA	NA	3.9	NA	12 J+	NA	NA	NA	NA	NA	NA	NA	33
LCBSB37[0.3]	07/24/03	0.3	NA	< 2.7 UJ	NA	32	NA	NA	NA	NA	13	NA	49	NA	NA	NA	NA	NA	NA	NA	42 J+

Table 10
Summary of Metals Results in Soil
Lobos Creek Target Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
			Analytical Method	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020
Cleanup Level			NE	5	5.9	320	10	1.7	120	20	43	NE	160	NE	NE	70	0.75	2	1	92	66
Sample Name	Sample Date	Sample Depth (feet)																			
LCBSB37[1]	07/24/03	1	NA	< 2.9 UJ	NA	17	NA	NA	NA	NA	7.7 J+	NA	44	NA	NA	NA	NA	NA	NA	NA	50
LCBSB38[0.3]	07/31/03	0.3	3,500	< 2.8 UJ	1.6	10	0.26	0.67	22	2.9	22	6,600	7.9	1,500 J-	74 J-	15	< 0.23	< 0.23	< 0.23	15	31
LCBSB38[1][MSD]	07/31/03	1	4,100	< 3.6 UJ	1.9	11	0.32	0.78	26	3.5	3.3	7,300	11	1,800 J-	74 J-	19	< 0.3	< 0.3	< 0.3	19	39
LCBSB39[0.3]	07/30/03	0.3	NA	< 2.9 UJ	NA	14	NA	NA	NA	NA	11	NA	38 J+	NA	NA	NA	NA	NA	NA	NA	32
LCBSB39[1][MSD]	07/30/03	1	NA	< 2.5 UJ	NA	13	NA	NA	NA	NA	4.1	NA	34 J+	NA	NA	NA	NA	NA	NA	NA	34
LCBSB40[0.3]	07/30/03	0.3	5,000	< 4.6 UJ	2.2	21	0.45	0.95	36	4.6	21	7,700	44	2,500 J-	86 J-	24	< 0.38	0.72	< 0.38	32	44
LCBSB40[1]	07/30/03	1	NA	< 4.1 UJ	NA	14	NA	NA	NA	NA	11	NA	30 J+	NA	NA	NA	NA	NA	NA	NA	36
LCBSB41[0.3]	07/30/03	0.3	NA	< 3.2 UJ	NA	16	NA	NA	NA	NA	5.5	NA	35 J+	NA	NA	NA	NA	NA	NA	NA	37
LCBSB41[1]	07/30/03	1	NA	< 2.4 UJ	NA	14	NA	NA	NA	NA	3.6	NA	15 J+	NA	NA	NA	NA	NA	NA	NA	45
DUP073003C	07/30/03	1.5	NA	< 2.5 UJ	NA	13	NA	NA	NA	NA	3	NA	7.9 J+	NA	NA	NA	NA	NA	NA	NA	33
LCBSB42[0.3]	07/30/03	0.3	NA	< 2.5 UJ	NA	17	NA	NA	NA	NA	4.5	NA	24 J+	NA	NA	NA	NA	NA	NA	NA	33
LCBSB42[1]	07/30/03	1	NA	< 2.8 UJ	NA	14	NA	NA	NA	NA	4.1	NA	23 J+	NA	NA	NA	NA	NA	NA	NA	32

Notes
mg/kg - milligrams per kilogram
Dup prefix indicates blind duplicate sample.
MSD - Matrix spike duplicate
MSD indicates to the laboratory which samples were to be used for the MSD quality control sample analyses. These are not matrix spike results.
NA - Not analyzed
NE - Not established
BOLD values indicate concentration exceeding cleanup levels.
Cleanup levels were obtained from Table 7-2 of the Cleanup Levels Document (EKI, 2002).
J+ - Data validation qualifier, "The analyte was positively identified; the associated numerical value is biased high due to a high surrogate recovery and should be considered an approximate concentration of the analyte in the sample."
J- - Data validation qualifier, "The analyte was positively identified; the associated numerical values is biased low due to a low surrogate recovery and should be considered an approximate concentration of the analyte in the sample."
UJ - Data validation qualifier, "The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample."

Table 11
Summary of Metals Results in Soil
Lobos Creek Protected Range
Small Arms Firing Ranges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analytical Method			SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020
Cleanup Level			NE	5	5.9	320	10	1.7	120	20	43	NE	160	NE	NE	70	0.75	2	1	92	66
Location ID	Sample ID	Sample Depth (feet)																			
LCPSB01[0.3]	07/28/03	0.3	NA	< 2.7 UJ	NA	17	NA	NA	NA	NA	3.6 J-	NA	5.2 J-	NA	NA	NA	NA	NA	NA	NA	16
LCPSB01[1]	07/28/03	1	4,400	< 2.7 UJ	2.6	40	0.26	0.81	38	5.2	8.9 J-	8,800	7.8	2,600	210	30	< 0.23	< 0.23	< 0.23	24	30
LCPSB02[0.3]	07/28/03	0.3	NA	< 3 UJ	NA	16	NA	NA	NA	NA	3.2 J-	NA	3.4 J-	NA	NA	NA	NA	NA	NA	NA	16
LCPSB02[1]	07/28/03	1	NA	< 3 UJ	NA	21	NA	NA	NA	NA	4.7 J-	NA	21 J-	NA	NA	NA	NA	NA	NA	NA	18
LCPSB03[0.3]	07/28/03	0.3	NA	< 2.5 UJ	NA	15	NA	NA	NA	NA	3.1 J-	NA	2.7 J-	NA	NA	NA	NA	NA	NA	NA	14
LCPSB03[1]	07/28/03	1	NA	< 3 UJ	NA	17	NA	NA	NA	NA	3.3 J-	NA	3.1 J-	NA	NA	NA	NA	NA	NA	NA	15
LCPSB04[0.3]	07/28/03	0.3	NA	< 2.8 UJ	NA	23	NA	NA	NA	NA	6.5 J-	NA	7.1 J-	NA	NA	NA	NA	NA	NA	NA	21
LCPSB04[1]	07/28/03	1	NA	< 2.8 UJ	NA	16	NA	NA	NA	NA	3.9 J-	NA	7.4 J-	NA	NA	NA	NA	NA	NA	NA	21
LCPSB05[0.3]	07/28/03	0.3	NA	< 2.9 UJ	NA	44	NA	NA	NA	NA	4.4 J-	NA	3.1 J-	NA	NA	NA	NA	NA	NA	NA	15
LCPSB05[1]	07/28/03	1	NA	< 2.9 UJ	NA	21	NA	NA	NA	NA	3.7 J-	NA	8.8 J-	NA	NA	NA	NA	NA	NA	NA	19
LCPSB06[0.3]	08/04/03	0.3	NA	< 3	NA	21	NA	NA	NA	NA	5	NA	16	NA	NA	NA	NA	NA	NA	NA	23
LCPSB06[1]	08/04/03	1	NA	< 3	NA	20	NA	NA	NA	NA	5	NA	10	NA	NA	NA	NA	NA	NA	NA	19
LCPSB07[0.3]	08/04/03	0.3	NA	< 3	NA	32	NA	NA	NA	NA	7.9	NA	13	NA	NA	NA	NA	NA	NA	NA	24
LCPSB07[1]	08/04/03	1	NA	< 3	NA	17	NA	NA	NA	NA	4.1	NA	22	NA	NA	NA	NA	NA	NA	NA	18
LCPSB08[1]	08/01/03	1	NA	< 2.9 R	NA	10	NA	NA	NA	NA	2.7	NA	3.1 J-	NA	NA	NA	NA	NA	NA	NA	17 J-
DUP080103B	08/01/03	0.5	NA	< 3 R	NA	11	NA	NA	NA	NA	3.3	NA	3.6	NA	NA	NA	NA	NA	NA	NA	15
LCPSB08[2]	08/01/03	2	NA	< 2.6 R	NA	8.8	NA	NA	NA	NA	2.2	NA	2.5 J-	NA	NA	NA	NA	NA	NA	NA	14 J-
LCPSB09[1]	08/01/03	1	NA	< 2.7 R	NA	16	NA	NA	NA	NA	3.3	NA	9.2 J-	NA	NA	NA	NA	NA	NA	NA	20 J-
LCPSB09[2]	08/01/03	2	NA	< 2.4 R	NA	12	NA	NA	NA	NA	2.5	NA	4.5 J-	NA	NA	NA	NA	NA	NA	NA	17 J-
LCPSB10[1]	08/01/03	1	NA	< 2.4 R	NA	9.6	NA	NA	NA	NA	2.3	NA	1.9 J-	NA	NA	NA	NA	NA	NA	NA	15 J-
LCPSB10[2][MSD]	08/01/03	2	NA	< 2.7 UJ	NA	11	NA	NA	NA	NA	2.1	NA	1.6	NA	NA	NA	NA	NA	NA	NA	12
LCPSB11[1]	07/23/03	1	NA	< 3 UJ	NA	8.9	NA	NA	NA	NA	1.9	NA	0.35	NA	NA	NA	NA	NA	NA	NA	11
LCPSB11[2]	07/23/03	2	NA	< 2.9 UJ	NA	11	NA	NA	NA	NA	2.2	NA	0.42	NA	NA	NA	NA	NA	NA	NA	14
LCPSB12[1]	07/23/03	1	NA	< 2.8 UJ	NA	12	NA	NA	NA	NA	2.1	NA	0.37	NA	NA	NA	NA	NA	NA	NA	13
LCPSB12[2]	07/23/03	2	NA	< 2.8 UJ	NA	10	NA	NA	NA	NA	2	NA	0.43	NA	NA	NA	NA	NA	NA	NA	12
LCPSB13[1][MSD]	07/23/03	1	NA	< 2.5 UJ	NA	14	NA	NA	NA	NA	2.1	NA	0.53	NA	NA	NA	NA	NA	NA	NA	14
LCPSB13[2]	07/23/03	2	NA	< 2.9 UJ	NA	8.4	NA	NA	NA	NA	2	NA	0.37	NA	NA	NA	NA	NA	NA	NA	11
LCPSB14[1]	08/01/03	1	NA	< 2.7 UJ	NA	12	NA	NA	NA	NA	3.3	NA	13	NA	NA	NA	NA	NA	NA	NA	17
LCPSB14[2]	08/01/03	2	NA	< 3 UJ	NA	11	NA	NA	NA	NA	3	NA	9.3	NA	NA	NA	NA	NA	NA	NA	17
DUP080103A	08/01/03	2.5	NA	< 2.8 UJ	NA	12	NA	NA	NA	NA	3.4	NA	12	NA	NA	NA	NA	NA	NA	NA	19
LCPSB15[1]	07/31/03	1	NA	< 2.8 UJ	NA	12	NA	NA	NA	NA	3.4	NA	8.5	NA	NA	NA	NA	NA	NA	NA	17
DUP073103E	07/31/03	0.5	NA	< 2.5 UJ	NA	12	NA	NA	NA	NA	3.6	NA	11	NA	NA	NA	NA	NA	NA	NA	17
LCPSB15[2]	07/31/03	2	NA	< 2.9 UJ	NA	10	NA	NA	NA	NA	2.8	NA	6.3	NA	NA	NA	NA	NA	NA	NA	14
LCPSB16[1]	07/23/03	1	NA	< 2.9 UJ	NA	12	NA	NA	NA	NA	2.3	NA	0.49	NA	NA	NA	NA	NA	NA	NA	14
LCPSB16[2]	07/23/03	2	NA	< 3 UJ	NA	9.1	NA	NA	NA	NA	2.1	NA	0.22	NA	NA	NA	NA	NA	NA	NA	11
LCPSB17[1]	07/23/03	1	NA	< 2.8 UJ	NA	17	NA	NA	NA	NA	2.2	NA	0.69	NA	NA	NA	NA	NA	NA	NA	18
LCPSB17[2]	07/23/03	2	NA	< 3 UJ	NA	13	NA	NA	NA	NA	2.5	NA	0.54	NA	NA	NA	NA	NA	NA	NA	17
LCPSB18[0.3]	07/23/03	0.3	NA	< 2.7 UJ	NA	27	NA	NA	NA	NA	7.4	NA	66	NA	NA	NA	NA	NA	NA	NA	53
LCPSB18[1]	07/23/03	1	NA	< 2.9 UJ	NA	20	NA	NA	NA	NA	7.4 J+	NA	43	NA	NA	NA	NA	NA	NA	NA	39
LCPSB19[0.3]	07/23/03	0.3	NA	< 2.8 UJ	NA	7.2	NA	NA	NA	NA	3.5 J+	NA	2.6	NA	NA	NA	NA	NA	NA	NA	19
LCPSB19[1]	07/23/03	1	NA	< 2.9 UJ	NA	7.9	NA	NA	NA	NA	3.3 J+	NA	4.4	NA	NA	NA	NA	NA	NA	NA	16
LCPSB20[1]	07/23/03	1	4,200	< 2.9 UJ	1.9	10	< 0.096	0.94	34	4.2	2.4 J+	7,400	0.38	1,900 J+	97	21	< 0.24	< 0.24	< 0.24	20	12
LCPSB20[2.5]	07/23/03	2.5	NA	< 2.8 UJ	NA	25	NA	NA	NA	NA	9.7 J+	NA	2.2	NA	NA	NA	NA	NA	NA	NA	14
LCPSB21[1]	07/23/03	1	3,700	< 3 UJ	2	11	< 0.1	0.87	24	4.1	2.8 J+	7,000	2.8	1,700 J+	120	19	< 0.25	< 0.25	< 0.25	17	16
LCPSB21[2.5]	07/23/03	2.5	NA	< 2.9 UJ	NA	17	NA	NA	NA	NA	6.3 J+	NA	4.3	NA	NA	NA	NA	NA	NA	NA	17

Table 11
Summary of Metals Results in Soil
Lobos Creek Protected Range
Small Arms Firing Ranges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analytical Method			SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020	SW6010/ 6020
Cleanup Level			NE	5	5.9	320	10	1.7	120	20	43	NE	160	NE	NE	70	0.75	2	1	92	66
Location ID	Sample ID	Sample Depth (feet)																			
LCPSB22[1]	07/31/03	1	NA	< 3 UJ	NA	22	NA	NA	NA	NA	6.9	NA	31	NA	NA	NA	NA	NA	NA	NA	56
LCPSB23[1]	07/31/03	1.5	NA	< 2.6 UJ	NA	12	NA	NA	NA	NA	3.5	NA	5.4	NA	NA	NA	NA	NA	NA	NA	16
DUP073103D	07/31/03	1	NA	< 3.1 UJ	NA	16	NA	NA	NA	NA	6.9	NA	14	NA	NA	NA	NA	NA	NA	NA	32
LCPSB24[1]	07/23/03	1	NA	< 2.9 UJ	NA	18	NA	NA	NA	NA	3.9 J+	NA	19	NA	NA	NA	NA	NA	NA	NA	28
LCPSB24[2.5]	07/23/03	2.5	NA	< 3 UJ	NA	23	NA	NA	NA	NA	3.5 J+	NA	13	NA	NA	NA	NA	NA	NA	NA	23
LCPSB25[1.5]	07/23/03	1.5	NA	< 3 UJ	NA	10	NA	NA	NA	NA	2.8 J+	NA	2.4	NA	NA	NA	NA	NA	NA	NA	16
LCPSB25[2.5]	07/23/03	2.5	NA	< 2.8 UJ	NA	18	NA	NA	NA	NA	3.5 J+	NA	3.3	NA	NA	NA	NA	NA	NA	NA	14
LCPSB26[0.3]	07/31/03	0.3	NA	< 3 UJ	NA	16	NA	NA	NA	NA	4.4	NA	6.7	NA	NA	NA	NA	NA	NA	NA	17
LCPSB26[1]	07/31/03	1	NA	< 2.7 UJ	NA	14	NA	NA	NA	NA	3.9	NA	5.5	NA	NA	NA	NA	NA	NA	NA	17
LCPSB27[1]	07/23/03	1	NA	< 2.9 UJ	NA	19	NA	NA	NA	NA	6.7 J+	NA	14	NA	NA	NA	NA	NA	NA	NA	110
LCPSB27[2]	07/23/03	2	NA	< 2.9 UJ	NA	13	NA	NA	NA	NA	2.4 J+	NA	0.84	NA	NA	NA	NA	NA	NA	NA	11
LCPSB28[1]	07/23/03	1	NA	< 2.8 UJ	NA	17	NA	NA	NA	NA	3.9	NA	2.5	NA	NA	NA	NA	NA	NA	NA	15
LCPSB28[2]	07/23/03	2	NA	< 3.1 UJ	NA	11	NA	NA	NA	NA	2.5	NA	0.75	NA	NA	NA	NA	NA	NA	NA	11
LCPSB29[1]	07/23/03	1	NA	< 2.8 UJ	NA	16	NA	NA	NA	NA	3.2	NA	6.9	NA	NA	NA	NA	NA	NA	NA	19
LCPSB29[2]	07/23/03	2	NA	< 2.7 UJ	NA	9.7	NA	NA	NA	NA	2.1	NA	0.47	NA	NA	NA	NA	NA	NA	NA	13
LCPSB30[1]	07/23/03	1	NA	< 3 UJ	NA	14	NA	NA	NA	NA	3.1 J-	NA	0.36	NA	NA	NA	NA	NA	NA	NA	19 J-
LCPSB30[2]	07/23/03	2	NA	< 2.9 UJ	NA	11	NA	NA	NA	NA	2.5 J-	NA	0.81	NA	NA	NA	NA	NA	NA	NA	14
LCPSB31[1]	08/04/03	1	NA	< 2.8	NA	11	NA	NA	NA	NA	3.7	NA	7.2	NA	NA	NA	NA	NA	NA	NA	17
LCPSB31[2]	08/04/03	2	NA	< 3	NA	9.7	NA	NA	NA	NA	3.2	NA	6.9	NA	NA	NA	NA	NA	NA	NA	16
LCPSB32[1]	07/23/03	1	NA	< 3 UJ	NA	13	NA	NA	NA	NA	4.6 J-	NA	7.1	NA	NA	NA	NA	NA	NA	NA	15 J-
LCPSB32[2]	07/23/03	2	NA	< 2.9 UJ	NA	8.3	NA	NA	NA	NA	3 J-	NA	0.8	NA	NA	NA	NA	NA	NA	NA	13
LCPSB33[1]	08/04/03	1	NA	< 2.7	NA	9.1	NA	NA	NA	NA	13	NA	34	NA	NA	NA	NA	NA	NA	NA	14
LCPSB33[2]	08/04/03	2	NA	< 3	NA	11	NA	NA	NA	NA	28	NA	51	NA	NA	NA	NA	NA	NA	NA	14
DUP080403A	08/04/03	2.5	NA	< 2.9	NA	9.1	NA	NA	NA	NA	24	NA	60	NA	NA	NA	NA	NA	NA	NA	14
LCPSB34[1]	07/23/03	1	NA	< 3 UJ	NA	12	NA	NA	NA	NA	9.5 J-	NA	44	NA	NA	NA	NA	NA	NA	NA	13
LCPSB34[2]	07/23/03	2	NA	< 2.9 UJ	NA	11	NA	NA	NA	NA	2.3 J-	NA	0.42	NA	NA	NA	NA	NA	NA	NA	14
DUP072303A	07/23/03	1.5	NA	< 2.9 UJ	NA	12	NA	NA	NA	NA	2.4 J-	NA	0.48	NA	NA	NA	NA	NA	NA	NA	15 J-
LCPSB35[1]	07/23/03	1	3,400	< 3 UJ	2.2	11	< 0.1	0.68	20	3.9	29 J-	6,300	58	1,600	110	30 J-	0.57 J-	< 0.25	< 0.25	15	15 J-
LCPSB35[2]	07/23/03	2	NA	< 2.9 UJ	NA	9.8	NA	NA	NA	NA	9.2 J-	NA	26	NA	NA	NA	NA	NA	NA	NA	14
LCPSB36[1]	07/23/03	1	NA	< 2.7 UJ	NA	9.3	NA	NA	NA	NA	2	NA	0.67	NA	NA	NA	NA	NA	NA	NA	11
LCPSB36[2]	07/23/03	2	NA	< 2.9 UJ	NA	7	NA	NA	NA	NA	1.7	NA	0.39	NA	NA	NA	NA	NA	NA	NA	9.9
LCPSB37[1]	07/23/03	1	NA	< 2.8 UJ	NA	75	NA	NA	NA	NA	14	NA	3.5	NA	NA	NA	NA	NA	NA	NA	85
LCPSB37[2]	07/23/03	2	3,100	< 2.8 UJ	2	15	0.11	0.69	19	3.5	3	5,900	1.3	1,500 J+	97	19	< 0.23	< 0.23	< 0.23	14	12
DUP072303B	07/23/03	1.5	3,700	< 2.9 UJ	2.4	33	0.14	0.86	22	4.6	7.1	7,700	5.7	1,700 J+	180	22	< 0.24	< 0.24	< 0.24	16	18

Notes
mg/kg - milligrams per kilogram
Dup prefix indicates blind duplicate sample.
MSD - Matrix spike duplicate
MSD indicates to the laboratory which samples were to be used for the MSD quality control sample analyses. These are not matrix spike results.
NA - Not analyzed
NE - Not established
BOLD values indicate concentration exceeding cleanup levels.
Cleanup levels were obtained from Table 7-2 of the Cleanup Levels Document (EKI, 2002).
J+ - Data validation qualifier, "The analyte was positively identified; the associated numerical value is biased high due to a high surrogate recovery and should be considered an approximate concentration of the analyte in the sample."
J- - Data validation qualifier, "The analyte was positively identified; the associated numerical values is biased low due to a low surrogate recovery and should be considered an approximate concentration of the analyte in the sample."
UJ - Data validation qualifier, "The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample."
R - Data validation qualifier, "The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified."

Table 12
Summary of Metals Results in Soil
Machine Gun Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc	
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
		Analytical Method	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	
Cleanup Level			NE	5	5.4	320	10	0.8	120	48	43	NE	160	NE	NE	71	1.1	2	1	74	60	
Sample Name	Sample Date	Sample Depth (feet)						ICP	ICP/MS													
MGBSB02[1]	07/22/03	1	NA	< 3.5 UJ	NA	70	NA	NA	NA	NA	15 J-	NA	27	NA	NA	NA	NA	NA	NA	NA	42 J-	
MGBSB02[2]	07/22/03	2	NA	< 3.4 UJ	NA	65	NA	NA	NA	NA	16 J-	NA	25	NA	NA	NA	NA	NA	NA	NA	50 J-	
MGBSB03[1]	07/22/03	1	NA	< 2.9 R	NA	75	NA	NA	NA	NA	12	NA	15	NA	NA	NA	NA	NA	NA	NA	53 J-	
MGBSB03[2]	07/22/03	2	NA	< 2.9 R	NA	82	NA	NA	NA	NA	29	NA	0.59	NA	NA	NA	NA	NA	NA	NA	39 J-	
MGBSB04[1]	07/22/03	1	NA	< 2.8 R	NA	94	NA	NA	NA	NA	15	NA	39	NA	NA	NA	NA	NA	NA	NA	63	
DUP072203A	07/22/03	1.5	NA	< 3 R	NA	150	NA	NA	NA	NA	21	NA	34	NA	NA	NA	NA	NA	NA	NA	64 J-	
MGBSB04[2]	07/22/03	2	NA	< 3 R	NA	190	NA	NA	NA	NA	25	NA	28	NA	NA	NA	NA	NA	NA	NA	57 J-	
MGBSB05[1]	07/22/03	1	NA	< 2.7 R	NA	49	NA	NA	NA	NA	10	NA	29	NA	NA	NA	NA	NA	NA	NA	43	
MGBSB05[2]	07/22/03	2	NA	< 2.7 R	NA	58	NA	NA	NA	NA	24	NA	200	NA	NA	NA	NA	NA	NA	NA	33	
MGBSB06[1]	07/22/03	1	6,100	< 2.8 R	3	35	0.11	1.2	< 0.25	50	7.6	6.6	9,900	15	38.00 J+	190	54	0.34	< 0.23	< 0.23	28	34
MGBSB06[2]	07/22/03	2	NA	< 2.6 R	NA	52	NA	NA	NA	NA	7.7	NA	10	NA	NA	NA	NA	NA	NA	NA	30	
MGBSB07[1]	07/22/03	1	NA	< 2.9 UJ	NA	30	NA	NA	NA	NA	5.7 J-	NA	3	NA	NA	NA	NA	NA	NA	NA	20 J-	
MGBSB07[2]	07/22/03	2	NA	< 3.2 UJ	NA	21	NA	NA	NA	NA	9 J-	NA	< 0.16	NA	NA	NA	NA	NA	NA	NA	24 J-	
MGBSB08[1]	07/22/03	1	NA	< 2.9 UJ	NA	67	NA	NA	NA	NA	6.7 J-	NA	19	NA	NA	NA	NA	NA	NA	NA	23 J-	
MGBSB08[2]	07/22/03	2	NA	< 2.8 UJ	NA	12	NA	NA	NA	NA	2.8 J-	NA	0.39	NA	NA	NA	NA	NA	NA	NA	13	
MGBSB09[1]	07/22/03	1	NA	< 3.1 UJ	NA	23	NA	NA	NA	NA	5.1 J-	NA	19	NA	NA	NA	NA	NA	NA	NA	24 J-	
MGBSB09[2]	07/22/03	2	NA	< 3.1 UJ	NA	16	NA	NA	NA	NA	3 J-	NA	1.6	NA	NA	NA	NA	NA	NA	NA	15 J-	
MGBSB10[1]	07/22/03	1	NA	< 3.1 UJ	NA	24	NA	NA	NA	NA	4 J-	NA	6.8	NA	NA	NA	NA	NA	NA	NA	16 J-	
MGBSB10[2]	07/22/03	2	NA	< 2.9 UJ	NA	42	NA	NA	NA	NA	6.6 J-	NA	36	NA	NA	NA	NA	NA	NA	NA	29 J-	
MGBSB11[1]	07/21/03	1	NA	< 2.8 R	NA	56	NA	NA	NA	NA	9.3	NA	19	NA	NA	NA	NA	NA	NA	NA	28	
MGBSB11[2]	07/21/03	2	NA	< 2.4 R	NA	91	NA	NA	NA	NA	13	NA	3.1	NA	NA	NA	NA	NA	NA	NA	30	
MGBSB12[1]	07/21/03	1	NA	< 2.6 R	NA	41	NA	NA	NA	NA	8.4	NA	32	NA	NA	NA	NA	NA	NA	NA	29	
MGBSB12[2]	07/21/03	2	NA	< 2.6 R	NA	26	NA	NA	NA	NA	4.4	NA	10	NA	NA	NA	NA	NA	NA	NA	23	
MGBSB13[1]	07/21/03	1	NA	< 2.7 R	NA	83	NA	NA	NA	NA	13	NA	15	NA	NA	NA	NA	NA	NA	NA	30	
MGBSB14[0.5]	07/21/03	0.5	NA	< 2.8 R	NA	110	NA	NA	NA	NA	17	NA	9.9	NA	NA	NA	NA	NA	NA	NA	37	
MGBSB14[1]	07/21/03	1	NA	< 2.9 R	NA	79	NA	NA	NA	NA	14	NA	13	NA	NA	NA	NA	NA	NA	NA	28	
MGBSB15[1]	07/21/03	1	NA	< 2.8 R	NA	60	NA	NA	NA	NA	9.2	NA	11	NA	NA	NA	NA	NA	NA	NA	33	
MGBSB16[1]	07/21/03	1	8,200	< 2.9 R	2.9	89	0.23	1.7	< 0.25	55	12	11	15,000	8.5	2,900 J+	340	59	1	< 0.24	< 0.24	40	35
MGBSB16[2]	07/21/03	2	NA	< 2.9 R	NA	71	NA	NA	NA	NA	11	NA	1.4	NA	NA	NA	NA	NA	NA	NA	27	
MGBSB17[1]	07/21/03	1	NA	< 2.8 R	NA	95	NA	NA	NA	NA	12	NA	30	NA	NA	NA	NA	NA	NA	NA	41	
MGBSB17[2]	07/21/03	2	NA	< 2.9 R	NA	100	NA	NA	NA	NA	11	NA	5.3	NA	NA	NA	NA	NA	NA	NA	36	
MGBSB18[1]	07/21/03	1	NA	< 3 R	NA	58	NA	NA	NA	NA	9.1	NA	6.3	NA	NA	NA	NA	NA	NA	NA	25	
MGBSB18[2]	07/21/03	2	NA	< 2.6 R	NA	31	NA	NA	NA	NA	4.2	NA	0.29	NA	NA	NA	NA	NA	NA	NA	19	
MGBSB19[0.3]	07/21/03	0.3	NA	< 3 R	NA	57	NA	NA	NA	NA	21	NA	120	NA	NA	NA	NA	NA	NA	NA	76	

Notes

mg/kg - milligrams per kilogram

Dup prefix indicates blind duplicate sample.

ICP - inductively coupled plasma

MS - mass spectrometry

NA - Not analyzed

NE - Not established

BOLD values indicate concentration exceeding cleanup levels.

Cleanup levels were obtained from Table 7-2 of the Cleanup Levels Document (EKL 2002).

J+ - Data validation qualifier, "The analyte was positively identified; the associated numerical value is biased high due to a high surrogate recovery and should be considered an approximate concentration of the analyte in the sample."

J- - Data validation qualifier, "The analyte was positively identified; the associated numerical values is biased low due to a low surrogate recovery and should be considered an approximate concentration of the analyte in the sample."

UJ - Data validation qualifier, "The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample."

R - Data validation qualifier, "The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified."

Table 13
Summary of Metals Results
California Highway Patrol Pistol Range
Small Arms Firing Ranges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium		Chromium	Cobalt	Copper	Iron	Lead	STLC Lead	TCLP Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(μg/L)	(μg/L)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analytical Method			SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/WET	SW6010/TCLP	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020
Cleanup or Regulatory Level			NE	5	5.9	320	10	0.8		120	20	43	NE	160	5,000	5,000	NE	NE	70	0.5	2	1	90	60
Sample Name	Sample Date	Sample Depth (feet)						ICP	ICP/MS															
CHPSB01[0.3]	07/30/03	0.3	NA	< 2.8 UJ	NA	90	NA	NA	NA	NA	NA	36	NA	120	NA	NA	NA	NA	NA	NA	NA	NA	NA	59
CHPSB01[1]	07/30/03	1	NA	< 3.2 UJ	NA	60	NA	NA	NA	NA	NA	11	NA	25	NA	NA	NA	NA	NA	NA	NA	NA	NA	46
CHPSB01[2]	07/30/03	2	NA	< 3.2 UJ	NA	65	NA	NA	NA	NA	NA	4.9	NA	5.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	19
CHPSB02[0.3]	07/30/03	0.3	3,800	< 3 UJ	1.6	73	0.25	1.1	NA	31	5.4	22	9,000	180	15,000	NA	1,700	420	25	< 0.25	< 0.25	0.27	19	110
CHPSB02[1]	07/30/03	1	NA	< 3 UJ	NA	54	NA	NA	NA	NA	NA	11	NA	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	42
CHPSB02[2][MSD]	07/30/03	2	NA	< 3.1 UJ	NA	59	NA	NA	NA	NA	NA	5.3	NA	8.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	20
CHPSB03[0.3]	07/30/03	0.3	NA	< 3 UJ	NA	64	NA	NA	NA	NA	NA	7.9	NA	220	12,000	NA	NA	NA	NA	NA	NA	NA	NA	70
CHPSB03[1]	07/30/03	1	NA	< 2.4 UJ	NA	52	NA	NA	NA	NA	NA	3.9	NA	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	19
CHPSB03[2]	07/30/03	2	NA	< 3.1 UJ	NA	33	NA	NA	NA	NA	NA	3.3	NA	13 J+	NA	NA	NA	NA	NA	NA	NA	NA	NA	18
DUP073003B	07/30/03	2.5	NA	< 2.6 UJ	NA	36	NA	NA	NA	NA	NA	4	NA	11 J+	NA	NA	NA	NA	NA	NA	NA	NA	NA	17
CHPSB05[1]	07/29/03	1	NA	4.6 J-	NA	44 J-	NA	NA	NA	NA	NA	31	NA	1,000	100,000	6,100	NA	NA	NA	NA	NA	NA	NA	63 J-
CHPSB06[1]	07/29/03	1	NA	3.7 J-	NA	56 J-	NA	NA	NA	NA	NA	37	NA	4,700	330,000	22,000	NA	NA	NA	NA	NA	NA	NA	110 J-
CHPSB06[2]	07/29/03	2	NA	< 3.1 UJ	NA	54 J-	NA	NA	NA	NA	NA	5.7	NA	19	NA	NA	NA	NA	NA	NA	NA	NA	NA	21 J-
CHPSB06[3]	07/29/03	3	NA	< 2.8 UJ	NA	27 J-	NA	NA	NA	NA	NA	3.5	NA	5.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	18 J-
CHPSB07[1]	07/29/03	1	NA	29 J-	NA	39 J-	NA	NA	NA	NA	NA	58	NA	6,000	480,000	100,000	NA	NA	NA	NA	NA	NA	NA	67 J-
CHPSB07[2]	07/29/03	2	NA	2.9 J-	NA	42 J-	NA	NA	NA	NA	NA	14	NA	470	49,000	NA	NA	NA	NA	NA	NA	NA	NA	28 J-
CHPSB07[3]	07/29/03	3	NA	< 2.8 UJ	NA	28 J-	NA	NA	NA	NA	NA	9.8	NA	260	31,000	NA	NA	NA	NA	NA	NA	NA	NA	23 J-
DUP072903D	07/29/03	2.5	NA	< 2.7 UJ	NA	29 J-	NA	NA	NA	NA	NA	5.6	NA	74	NA	NA	NA	NA	NA	NA	NA	NA	NA	16 J-
CHPSB08[1]	07/29/03	1	4,500	< 2.8 UJ	2	33	0.15	0.81	NA	29	4.2	5.1	7,400	61	NA	NA	1,700	120	22	< 0.24	< 0.24	< 0.24	20	28
CHPSB08[2]	07/29/03	2	NA	< 2.7 UJ	NA	28 J-	NA	NA	NA	NA	NA	4.6	NA	42	NA	NA	NA	NA	NA	NA	NA	NA	NA	23 J-
CHPSB09[2]	07/29/03	2	NA	< 2.9 UJ	NA	34	NA	NA	NA	NA	NA	4.2 J-	NA	9.4 J-	NA	NA	NA	NA	NA	NA	NA	NA	NA	19
DUP072903A	07/29/03	1.5	NA	< 2.6 UJ	NA	34	NA	NA	NA	NA	NA	4.7 J-	NA	4.7 J-	NA	NA	NA	NA	NA	NA	NA	NA	NA	15
CHPSB09[3]	07/29/03	3	4,100	< 2.9 UJ	1.9	17	< 0.098	0.6	NA	28	3.6	3.8 J-	6,600	6.3	NA	NA	1,700	81	21	0.32	< 0.24	< 0.24	17	15
CHPSB09[4]	07/29/03	4	5,500	< 2.7 UJ	2.2	25	0.15	0.77	NA	30	4.7	3.8 J-	8,200	3	NA	NA	2,100	100	27	< 0.23	< 0.23	< 0.23	23	15
CHPSB10[2]	07/29/03	2	4,200	< 2.4 UJ	2	18	0.098	0.61	NA	27	4	2.7 J-	6,500	2.1	NA	NA	1,800	89	23	< 0.2	< 0.2	< 0.2	18	13
DUP072903B	07/29/03	2.5	4,600	< 2.8 UJ	2.1	18	0.11	0.68	NA	30	4.4	3 J-	7,300	2	NA	NA	1,900	110	23	< 0.23	< 0.23	0.43	22	14
CHPSB10[3]	07/29/03	3	NA	< 2.7 UJ	NA	18	NA	NA	NA	NA	NA	2.9	NA	6.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	14
CHPSB10[4]	07/29/03	4	NA	< 3.1 UJ	NA	18	NA	NA	NA	NA	NA	2.6	NA	9.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	13
CHPSB11[1]	07/30/03	1	NA	< 2.7 UJ	NA	20	NA	NA	NA	NA	NA	3.9	NA	23	NA	NA	NA	NA	NA	NA	NA	NA	NA	34
DUP073003A	07/30/03	0.5	NA	< 2.9 UJ	NA	24	NA	NA	NA	NA	NA	4.9	NA	51	NA	NA	NA	NA	NA	NA	NA	NA	NA	45
CHPSB11[2]	07/30/03	2	NA	< 2.8 UJ	NA	23	NA	NA	NA	NA	NA	3.3	NA	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	21
CHPSB11[3][MSD]	07/30/03	3	NA	< 3 UJ	NA	31	NA	NA	NA	NA	NA	4.3	NA	25	NA	NA	NA	NA	NA	NA	NA	NA	NA	25
CHPSB12[1]	07/30/03	1	NA	< 2.7 UJ	NA	31	NA	NA	NA	NA	NA	4.5	NA	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	29
CHPSB12[2]	07/30/03	2	3,700	< 2.8 UJ	1.6	34	0.2	0.97	NA	31	4	4.7	9,700	17	NA	NA	1,500	120	21	< 0.23	< 0.23	< 0.23	26	18
CHPSB12[3]	07/30/03	3	4,200	< 2.7 UJ	1.7	49	0.28	1.9	NA	52	4.3	5.8	19,000	17	NA	NA	1,500	130	31	< 0.22	< 0.22	< 0.22	51	19
CHPSB13[1]	07/30/03	1	NA	< 2.4 UJ	NA	49	NA	NA	NA	NA	NA	6	NA	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	28
CHPSB13[2]	07/30/03	2	NA	< 3 UJ	NA	52	NA	NA	NA	NA	NA	6.9	NA	5.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	34
CHPSB13[3]	07/30/03	3	NA	< 2.6 UJ	NA	54	NA	NA	NA	NA	NA	7.6	NA	5.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	23
CHPSB14[1]	07/29/03	1	NA	< 2.3 UJ	NA	35 J-	NA	NA	NA	NA	NA	4.5	NA	14	NA	NA	NA	NA	NA	NA	NA	NA	NA	24 J-
CHPSB14[2]	07/29/03	2	NA	< 2.7 UJ	NA	36 J-	NA	NA	NA	NA	NA	4.3	NA	8.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	19 J-
CHPSB14[3]	07/29/03	3	NA	< 2.5 UJ	NA	27 J-	NA	NA	NA	NA	NA	3.3	NA	3.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	16 J-
CHPSB15[1]	07/29/03	1	NA	< 3 UJ	NA	55 J-	NA	NA	NA	NA	NA	8.7	NA	54	NA	NA	NA	NA	NA	NA	NA	NA	NA	43 J-
CHPSB15[2]	07/29/03	2	NA	< 2.6 UJ	NA	34 J-	NA	NA	NA	NA	NA	4.7	NA	33	NA	NA	NA	NA	NA	NA	NA	NA	NA	23 J-
CHPSB15[3]	07/29/03	3	NA	< 3.2 UJ	NA	50 J-	NA	NA	NA	NA	NA	7.2	NA	45	NA	NA	NA	NA	NA	NA	NA	NA	NA	39 J-
CHPSB16[0.3]	07/29/03	0.3	NA	< 3 UJ	NA	51	NA	NA	NA	NA	NA	7.8	NA	130	NA	NA	NA	NA	NA	NA	NA	NA	NA	54
CHPSB16[1]	07/29/03	1	NA	< 2.9 UJ	NA	30	NA	NA	NA	NA	NA	4.1	NA	8.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	18
CHPSB16[2]	07/29/03	2	NA	< 2.7 UJ	NA	24	NA	NA	NA	NA	NA	4.1	NA	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	16
DUP072903C	07/29/03	1.5	NA	< 2.9 UJ	NA	30	NA	NA	NA	NA	NA	4.8	NA	41	NA	NA	NA	NA	NA	NA	NA	NA	NA	25
CHPSB17[2]	07/29/03	2	NA	< 3 UJ	NA	21 J-	NA	NA	NA	NA	NA	3.4	NA	6.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	15 J-

Table 13
Summary of Metals Results
California Highway Patrol Pistol Range
Small Arms FiringRanges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	STLC Lead	TCLP Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(µg/L)	(µg/L)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Analytical Method			SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/WET	SW6010/TCLP	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020
Cleanup or Regulatory Level			NE	5	5.9	320	10	0.8	120	20	43	NE	160	5,000	5,000	NE	NE	70	0.5	2	1	90	60
Sample Name	Sample Date	Sample Depth (feet)						ICP	ICP/MS														
CHPSB17[3]	07/29/03	3	NA	< 2.8 UJ	NA	16 J-	NA	NA	NA	NA	NA	2.6	NA	3.9	NA	NA	NA	NA	NA	NA	NA	NA	13 J-
CHPSB18[0.3]	07/29/03	0.3	NA	< 2.8 UJ	NA	41	NA	NA	NA	NA	NA	6 J-	NA	81 J-	NA	NA	NA	NA	NA	NA	NA	NA	47
CHPSB18[1]	07/29/03	1	NA	< 3 UJ	NA	40	NA	NA	NA	NA	NA	6 J-	NA	69 J-	NA	NA	NA	NA	NA	NA	NA	NA	46
CHPSB18[2]	07/29/03	2	NA	< 2.9 UJ	NA	31	NA	NA	NA	NA	4.2 J-	NA	10 J-	NA	NA	NA	NA	NA	NA	NA	NA	NA	18
CHPSB19[2]	07/29/03	2	3,700	< 2.9 UJ	1.5	27	0.17	0.69	NA	29	3.6	3.8	6,600	18	NA	1,500	110	19	< 0.25	< 0.25	< 0.25	18	25
CHPSB19[3]	07/29/03	3	NA	< 2.6 UJ	NA	24 J-	NA	NA	NA	NA	3.5	NA	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	22 J-
CHPSB19[4]	07/29/03	4	3,500	< 2.7 UJ	1.8	17	0.17	0.63	NA	24	3.5	2.5	6,200	7.9	NA	1,500	98	19	< 0.22	< 0.22	< 0.22	16	16
CHPSB20[1]	07/29/03	1	NA	< 2.8 UJ	NA	46 J-	NA	NA	NA	NA	11	NA	15	NA	NA	NA	NA	NA	NA	NA	NA	NA	73 J-
CHPSB20[2]	07/29/03	2	NA	< 2.6 UJ	NA	57	NA	NA	NA	NA	11	NA	25	NA	NA	NA	NA	NA	NA	NA	NA	NA	43
CHPSB20[3]	07/29/03	3	NA	< 3.1 UJ	NA	61	NA	NA	NA	NA	6.8	NA	38	NA	NA	NA	NA	NA	NA	NA	NA	NA	32
CHPSB21[0.3]	07/25/03	0.3	NA	< 2.8 UJ	NA	35	NA	NA	NA	NA	4.4 J	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	16 J-
CHPSB21[1]	07/25/03	1	NA	< 3.4 UJ	NA	57	NA	NA	NA	NA	6.2 J	NA	0.61	NA	NA	NA	NA	NA	NA	NA	NA	NA	20 J-
CHPSB21[2.5]	07/25/03	2.5	NA	< 3.4 UJ	NA	85	NA	NA	NA	NA	16 J	NA	< 0.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	31 J-
CHPSB22[0.3]	07/25/03	0.3	5,200	< 2.8	2.3	28	< 0.094	1	< 0.25	38	4.7	3.9	9,100	5.4	NA	1,800	140	25	< 0.24	< 0.24	< 0.24	24	22
CHPSB22[1]	07/25/03	1	NA	< 3.2 UJ	NA	58	NA	NA	NA	NA	5.7 J	NA	0.76	NA	NA	NA	NA	NA	NA	NA	NA	NA	18 J-
CHPSB22[2.5]	07/25/03	2.5	NA	< 2.5 UJ	NA	42	NA	NA	NA	NA	4.4 J	NA	0.34	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 J-
CHPSB23[0.3]	07/25/03	0.3	NA	< 2.9 UJ	NA	71	NA	NA	NA	NA	22 J	NA	25	NA	NA	NA	NA	NA	NA	NA	NA	NA	37 J-
CHPSB23[1]	07/25/03	1	NA	< 2.8 UJ	NA	34	NA	NA	NA	NA	5.3 J	NA	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	55 J-
CHPSB23[2.5]	07/25/03	2.5	NA	< 3.1 UJ	NA	37	NA	NA	NA	NA	5.5 J	NA	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	77 J-
CHPSB24[0.3]	07/25/03	0.3	NA	< 2.4 UJ	NA	44	NA	NA	NA	NA	140 J	NA	29	NA	NA	NA	NA	NA	NA	NA	NA	NA	120 J-
CHPSB24[1]	07/25/03	1	NA	< 2.7 UJ	NA	41	NA	NA	NA	NA	6 J	NA	15	NA	NA	NA	NA	NA	NA	NA	NA	NA	70 J-
CHPSB24[2.5]	07/25/03	2.5	NA	< 3.5 UJ	NA	29	NA	NA	NA	NA	3.9 J	NA	0.97	NA	NA	NA	NA	NA	NA	NA	NA	NA	17 J-
CHPSB25[1]	07/25/03	1	4,200	< 3.1	2.4	25	< 0.1	1	NA	36	4.2	9.8	9,300	50	NA	1,700	120	21	< 0.26	< 0.26	< 0.26	26	40
DUP072503A	07/25/03	0.5	4,200	< 2.7	2.1	26	< 0.089	1	NA	36	4.1	7.8	9,400	53	NA	1,700	120	21	< 0.22	< 0.22	< 0.22	26	38
CHPSB25[2]	07/25/03	2	NA	< 3 UJ	NA	33	NA	NA	NA	NA	5.2 J	NA	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	32 J-
CHPSB25[3]	07/25/03	3	NA	< 3 UJ	NA	30	NA	NA	NA	NA	3.5 J	NA	3.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	29 J-
CHPSB26[1]	07/25/03	1	NA	< 3.2 UJ	NA	37	NA	NA	NA	NA	5.3 J	NA	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	35 J-
CHPSB26[3]	07/25/03	3	NA	< 2.8 UJ	NA	82	NA	NA	NA	NA	6.8 J	NA	5.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	27 J-
CHPSB27[1]	07/29/03	1	NA	< 3.1 UJ	NA	53	NA	NA	NA	NA	15	NA	64	NA	NA	NA	NA	NA	NA	NA	NA	NA	93
CHPSB27[2][MSD]	07/29/03	2	NA	< 2.9 UJ	NA	64 J-	NA	NA	NA	NA	8.6	NA	4.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	61 J-
CHPSB27[3]	07/29/03	3	NA	< 2.9 UJ	NA	43	NA	NA	NA	NA	8.9	NA	4.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	83

Notes
mg/kg - milligrams per kilogram
µg/L - micrograms per liter
Dup prefix indicates blind duplicate sample.
ICP - inductively coupled plasma
MS - mass spectrometry
MSD - Matrix spike duplicate
MSD indicates to the laboratory which samples were to be used for the MSD quality control sample analyses. These are not matrix spike results.
NA - Not analyzed
NE - Not established
STLC - Soluble Threshold Limit Concentration
TCLP - Toxicity Characteristic Leaching Procedure
BOLD values indicate concentration exceeding cleanup or regulatory levels.
Cleanup levels were obtained from Table 7-2 of the Cleanup Levels Document (EKI, 2003).
J- - Data validation qualifier, "The analyte was positively identified; the associated numerical values is biased low due to a low surrogate recovery and should be considered an approximate concentration of the analyte in the sample."
UJ - Data validation qualifier, "The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample."
J+ - Data validation qualifier, "The analyte was positively identified; the associated numerical value is biased high due to a high surrogate recovery and should be considered an approximate concentration of the analyte in the sample."
J - Data validation qualifier, "The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample."

Table 14
Summary of Metals Results in Soil
Barnard Avenue Protected Range
Small Arms Firing Ranges
Presidio of San Francisco, California

			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium		Chromium	Cobalt	Copper	Iron	Lead	STLC Lead	Magnesium	Manganese	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(µg/L)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
			Analytical Method	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/WET	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020	SW6010/6020
Cleanup or Regulatory Level			NE	5	5.4	320	10	0.8		120	20	43	NE	160	5,000	NE	NE	70	0.5	2	1	74	60
Sample Name	Sample Date	Sample Depth (feet)						ICP	ICP/MS														
BAPSB01[4.5][MSD]	07/25/03	4.5	NA	< 2.9 R	NA	170	NA	NA	NA	NA	NA	15	NA	3.3	NA	NA	NA	NA	NA	NA	NA	NA	38 J-
BAPSB01[5.5]	07/25/03	5.5	NA	< 3.3 R	NA	88	NA	NA	NA	NA	NA	8.5	NA	1.6	NA	NA	NA	NA	NA	NA	NA	NA	21 J-
BAPSB02[3]	07/25/03	3	NA	< 2.8 R	NA	130	NA	NA	NA	NA	NA	15	NA	27	NA	NA	NA	NA	NA	NA	NA	NA	81 J-
DUP072503B	07/25/03	3.5	NA	< 3.1 R	NA	170	NA	NA	NA	NA	NA	18	NA	18	NA	NA	NA	NA	NA	NA	NA	NA	73 J-
BAPSB02[5.5]	07/25/03	5.5	NA	< 3.1 R	NA	96	NA	NA	NA	NA	NA	6.4	NA	1	NA	NA	NA	NA	NA	NA	NA	NA	14 J-
BAPSB03R[5.5]	08/01/03	5.5	NA	< 3.1 UJ	NA	140 J-	NA	NA	NA	NA	NA	23 J-	NA	230 J-	< 1,500	NA	NA	NA	NA	NA	NA	NA	200 J-
BAPSB03R[6.5]	08/01/03	6.5	NA	< 3.1 UJ	NA	100 J-	NA	NA	NA	NA	NA	7.8 J-	NA	5.4 J-	NA	NA	NA	NA	NA	NA	NA	NA	28 J-
BAPSB04[1][MSD]	08/01/03	1	NA	< 2.9 UJ	NA	140 J-	NA	NA	NA	NA	NA	14 J-	NA	67 J-	NA	NA	NA	NA	NA	NA	NA	NA	100 J-
DUP080103D	08/01/03	1.5	NA	< 2.6 UJ	NA	56 J-	NA	NA	NA	NA	NA	7.1 J-	NA	13 J-	NA	NA	NA	NA	NA	NA	NA	NA	38 J-
BAPSB04[3]	08/01/03	3	NA	< 2.8 UJ	NA	40 J-	NA	NA	NA	NA	NA	4.8 J-	NA	3.6 J-	NA	NA	NA	NA	NA	NA	NA	NA	20 J-
BAPSB05[7][MSD]	08/01/03	7	NA	< 3.4 UJ	NA	110 J-	NA	NA	NA	NA	NA	10 J-	NA	17 J-	NA	NA	NA	NA	NA	NA	NA	NA	33 J-
DUP080103F	08/01/03	7.5	NA	< 3.3 UJ	NA	110 J-	NA	NA	NA	NA	NA	9.6 J-	NA	9 J-	NA	NA	NA	NA	NA	NA	NA	NA	30 J-
BAPSB05[8.5]	08/01/03	8.5	NA	< 3.6 UJ	NA	94 J-	NA	NA	NA	NA	NA	6.9 J-	NA	5.4 J-	NA	NA	NA	NA	NA	NA	NA	NA	22 J-
BAPSB06[5.5]	07/25/03	5.5	NA	< 2.9 R	NA	110	NA	NA	NA	NA	NA	8.2	NA	4.3	NA	NA	NA	NA	NA	NA	NA	NA	25 J-
BAPSB07[5.5]	08/01/03	5.5	NA	< 2.7 UJ	NA	31 J-	NA	NA	NA	NA	NA	6.5 J-	NA	9.2 J-	NA	NA	NA	NA	NA	NA	NA	NA	23 J-
BAPSB08R[6.5]	08/01/03	6.5	NA	< 3.1	NA	60	NA	NA	NA	NA	NA	6.3	NA	2.6	NA	NA	NA	NA	NA	NA	NA	NA	21
BAPSB08R[7.5]	08/01/03	7.5	NA	< 3.2	NA	39	NA	NA	NA	NA	NA	5.8	NA	2.3	NA	NA	NA	NA	NA	NA	NA	NA	20
BAPSB09[0.3]	07/25/03	0.3	NA	< 2.3 R	NA	52	NA	NA	NA	NA	NA	6.5	NA	19	NA	NA	NA	NA	NA	NA	NA	NA	33 J-
BAPSB09[1]	07/25/03	1	NA	< 2.6 R	NA	30	NA	NA	NA	NA	NA	5.2	NA	< 0.13	NA	NA	NA	NA	NA	NA	NA	NA	22 J-
BAPSB10[1][MSD]	08/01/03	1	7200	< 2.9 R	1.8 J-	33	0.23	1.2 J-	< 0.25	50 J-	8.8 J-	5.6	12,000	12 J-	NA	2,100 J-	250	39 J-	< 0.24 UJ	< 0.24	< 0.24 UJ	29 J-	30 J-
BAPSB10[2]	08/01/03	2	NA	< 2.9 UJ	NA	31 J-	NA	NA	NA	NA	NA	3.7 J-	NA	3 J-	NA	NA	NA	NA	NA	NA	NA	NA	18 J-
BAPSB11[2]	07/25/03	2	NA	< 2.7 R	NA	69	NA	NA	NA	NA	NA	5.2	NA	0.89	NA	NA	NA	NA	NA	NA	NA	NA	24 J-
BAPSB11[3]	08/01/03	3	NA	< 2.7	NA	60	NA	NA	NA	NA	NA	6	NA	22	NA	NA	NA	NA	NA	NA	NA	NA	27
BAPSB12[1]	08/01/03	1	590	< 2.9 R	2.5 J-	35	0.19	1.1 J-	< 0.25	56 J-	7.2 J-	8.8	1,100	15 J-	NA	680 J-	180	70 J-	< 0.24 UJ	< 0.24	< 0.24 UJ	24 J-	21 J-
DUP080103C	08/01/03	1.5	6700	< 2.5 R	2.8 J-	38	0.22	1.2 J-	< 0.25	60 J-	6.9 J-	8.4	12,000	16 J-	NA	5,500 J-	180	58 J-	< 0.21 UJ	< 0.21	< 0.21 UJ	29 J-	23 J-
BAPSB12[3]	08/01/03	3	NA	< 2.6 UJ	NA	34 J-	NA	NA	NA	NA	NA	8.3 J-	NA	18 J-	NA	NA	NA	NA	NA	NA	NA	NA	30 J-
BAPSB13[0.3]	07/28/03	0.3	7700	< 3.1 UJ	3	98	0.37	1.7	< 0.25	57	11	19	14,000	160	NA	3,600	360	68	< 0.26	< 0.26	< 0.26	39	210
BAPSB13[1]	07/28/03	1	6800	< 3.3 UJ	2.2	77	0.3	1.3	< 0.25	52	9.8	12	13,000	39	NA	2,700	430	49	< 0.28	< 0.28	< 0.28	31	48
BAPSB14[0.3]	07/28/03	0.3	NA	< 3 UJ	NA	57	NA	NA	NA	NA	NA	11 J-	NA	36 J-	NA	NA	NA	NA	NA	NA	NA	NA	48
BAPSB14[1][MSD]	07/28/03	1	NA	< 3.3 UJ	NA	37	NA	NA	NA	NA	NA	6.7	NA	6.1	NA	NA	NA	NA	NA	NA	NA	NA	31
BAPSB15[0.3]	07/25/03	0.3	NA	< 2.8 R	NA	40	NA	NA	NA	NA	NA	6.1	NA	16	NA	NA	NA	NA	NA	NA	NA	NA	29 J-
BAPSB15[1]	07/25/03	1	NA	< 2.7 R	NA	30	NA	NA	NA	NA	NA	2.6	NA	0.23	NA	NA	NA	NA	NA	NA	NA	NA	18 J-
BAPSB16[0.3][MSD]	08/01/03	0.3	NA	< 3 UJ	NA	41 J-	NA	NA	NA	NA	NA	5.7 J-	NA	5.3 J-	NA	NA	NA	NA	NA	NA	NA	NA	25 J-
BAPSB16[1]	08/01/03	1	NA	< 2.9 UJ	NA	38 J-	NA	NA	NA	NA	NA	4.7 J-	NA	4.8 J-	NA	NA	NA	NA	NA	NA	NA	NA	20 J-
DUP080103E	08/01/03	1.5	NA	< 3 UJ	NA	55 J-	NA	NA	NA	NA	NA	6.8 J-	NA	24 J-	NA	NA	NA	NA	NA	NA	NA	NA	29 J-
BAPSB17[0.3][MSD]	07/28/03	0.3	NA	< 3.1 UJ	NA	48	NA	NA	NA	NA	NA	9.4 J-	NA	44 J-	NA	NA	NA	NA	NA	NA	NA	NA	41
BAPSB17[1]	07/28/03	1.5	NA	< 3 UJ	NA	41	NA	NA	NA	NA	NA	6.5 J-	NA	11 J-	NA	NA	NA	NA	NA	NA	NA	NA	31
DUP072803A	07/28/03	1	NA	< 3.1 UJ	NA	31	NA	NA	NA	NA	NA	7.5 J-	NA	91 J-	NA	NA	NA	NA	NA	NA	NA	NA	22
BAPSB18[0.3]	07/28/03	0.3	NA	< 3.1 UJ	NA	81	NA	NA	NA	NA	NA	70 J-	NA	150 J-	NA	NA	NA	NA	NA	NA	NA	NA	350
BAPSB18[1]	07/28/03	1	NA	< 3.2 UJ	NA	58	NA	NA	NA	NA	NA	13 J-	NA	52 J-	NA	NA	NA	NA	NA	NA	NA	NA	98

Notes

mg/kg - milligrams per kilogram

µg/L - micrograms per liter

Dup prefix indicates blind duplicate sample.

MSD - Matrix spike duplicate

MSD indicates to the laboratory which samples were to be used for the MSD quality control sample analyses. These are not matrix spike results.

NA - Not analyzed

NE - Not established

STLC - Soluble Threshold Limit Concentration

BOLD values indicate concentration exceeding cleanup or regulatory levels.

Cleanup levels were obtained from Table 7-2 of the Cleanup Levels Document (EKI, 2002).

J- - Data validation qualifier, "The analyte was positively identified; the associated numerical values is biased low due to a low surrogate recovery and should be considered an approximate concentration of the analyte in the sample."

UJ - Data validation qualifier, "The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate

and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample."

R - Data validation qualifier, "The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified."

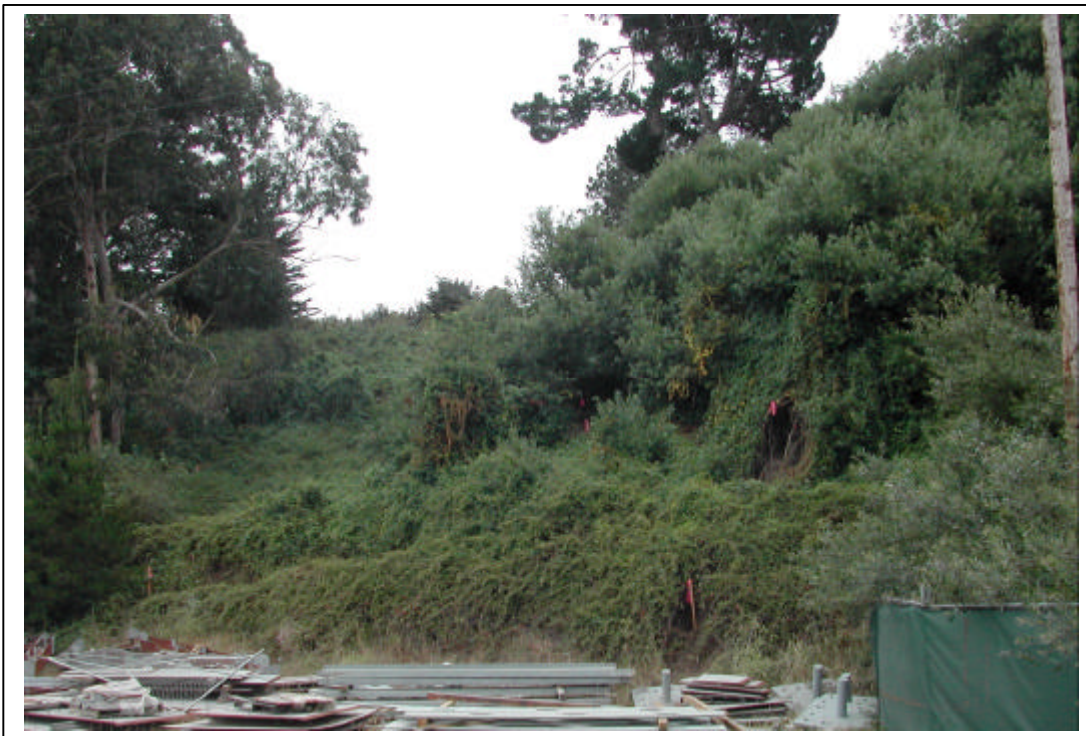
ICP - inductively coupled plasma

MS - mass spectrometry

Table 15
Summary of Sites
Recommended Additional RI Sampling Locations
Small Arms Firing Ranges
Presidio of San Francisco, California

Site	RI Sample Locations Exceeding Cleanup Levels	Proposed RI Sample Location ID	Number of RI Sample Locations	Number of RI Samples	Sample Depth (feet)	Sample Analysis (EPA 6010)	Sample Collection (hours)
CHP Pistol Range							
	CHPSB02	CHPSB 27	2	2	0.3	Lead, Zinc	
	CHPSB03	CHPSB 28		2	1.0	Lead, Zinc	
	CHPSB24	CHPSB 29	1	2	0.3	Copper, Zinc	
				1.0			
Total number of sample locations and samples: CHP Pistol Range			3	6			1.5
Lobos Creek Protected Range							
	LCPSB27	LCPSB 38	1	2	1.0	Zinc	
					2.0		
Total number of sample locations and samples: Lobos Creek Protected Range			1	2			0.8
Machine Gun Butt							
	MGBSB19	MGBSB 20	2	3	0.3	Zinc	
					1.0		
		MGBSB 21		3	2.0	Zinc	
					0.3		
					1.0		
					2.0		
Total number of sample locations and samples: Machine Gun Butt			2	6			3.0
Barnard Avenue Protected Range							
	BAPSB18	BAPSB 18R	1	1	3.0	Copper, Zinc	
	BAPSB13	BAPSB 19	3	2	0.3	Ainc	
		BAPSB 20		3	1.0	Copper, Zinc	
					0.3		
		BAPSB 21		3	1.0	Copper, Zinc	
					3.0		
		BAPSB 22	1	3	1.0	Lead, Zinc	
	BAPSB02				3.0		
		BAPSB 23	1	3	6.0	Lead, Zinc	
	BAPSB03R				1.0		
		BAPSB 24	1	3	3.0	Zinc	
	BAPSB04				6.0		
					1.0		
					3.0		
					6.0		
Total number of sample locations and samples: Barnard Avenue Protected Range			7	18			8.0
Notes: A total of 10% duplicate samples and 5% matrix spike/matrix spike duplicates would also be collected.							

PHOTOGRAPHS



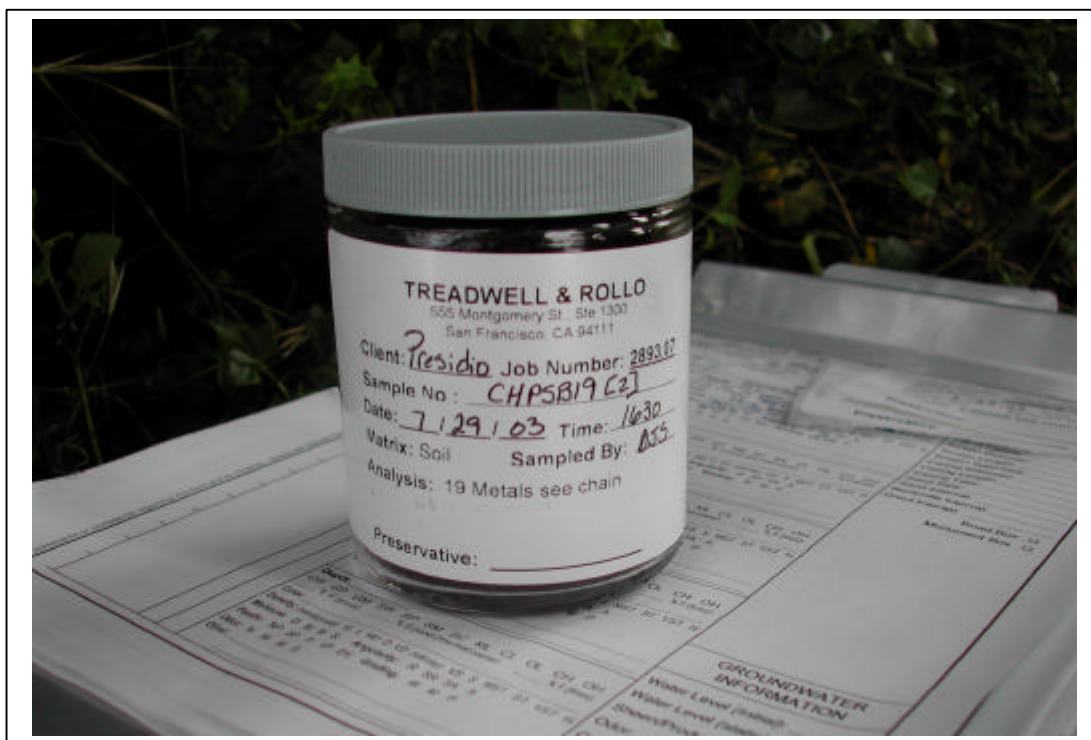
Photograph 1 Machine Gun Butt



Photograph 2 Vegetative Cover Typical at Machine Gun Butt



Photograph 3 Hand-augering at CHPSB09



Photograph 4 Labeled Sample Jar



Photograph 5 Direct-push Rig at BAPSB09



Photograph 6 Hand Auger Decontamination



Photograph 7 Direct Push Rig at Lobos Creek Target Butt



Photograph 8 Traffic Control at Lobos Creek Target Butt

APPENDIX A
Historical Results

APPENDIX A HISTORICAL RESULTS

This appendix presents a summary of the Site Investigation (SI) sampling results for the Small Arms Firing Ranges. The SI was conducted by Montgomery Watson for the Army in 1996 and 1997 (Montgomery Watson, 1997). Tables A-1 through A-4 summarize the SI sample results for the Lobos Creek Target Butt (LCTB), Lobos Creek Protected Range (LCPR), Machine Gun Butt (MGB), and California Highway Patrol Pistol Range (CHP), respectively. The tables indicate exceedances of screening, threshold, and cleanup levels. Figures A-1 through A-4 present the sample locations and analytical results which exceed the screening, threshold, and cleanup levels for each site. Antimony detection limits obtained during the SI exceed the screening, threshold, and cleanup levels and antimony results are, therefore, not discussed below. The copper detection limits obtained during the SI exceed all the screening and threshold levels for the small arms firing range sites, except for those sites with serpentinite lithology.

A.1 Lobos Creek Target Butt

During the SI, Montgomery Watson (1997) collected samples from 32 locations using hand augers and trowels. A total of 46 samples were analyzed from depths of 0.3 feet and 1.0 foot. Some samples were collected from trenches due to the size and eroded conditions of the soil berm. Sample locations and exceedances of screening, threshold, and cleanup levels are shown on Figure A-1, and historical results are summarized in Table A-1. Results are by field x-ray fluorescence (XRF) unless stated. As shown on Figure A-1 and in Table A-1, cleanup level exceedances occurred at all SI sampling locations. A total of 14 bullets were discovered at the LCTB during the SI.

Lead was detected above the screening level (21 mg/kg) and below the threshold level (57 mg/kg) at 15 sample locations. Concentrations ranged from 26 mg/kg in LCBBR65 to 56 mg/kg in LCBBR74. The lead threshold for beach/dune sand (57 mg/kg) was exceeded at six sample locations and ranged from 65 mg/kg at LCBSS10 to 136 mg/kg in LCBBR80. Lead was detected above the cleanup level (160 mg/kg) in sample LCBSS02 (0.3 feet) at a concentration of 230 mg/kg. The fixed lab result for lead in this sample was 171 mg/kg. Lead was also detected at the cleanup level of 160 mg/kg in sample LCBBR80 (1.0 feet). The fixed lab result for lead in this sample was 136 mg/kg.

The screening level for zinc (42 mg/kg) was exceeded at four sample locations with concentrations of 55 mg/kg at LCBBR77 to 65 mg/kg in LCBSS07. The zinc threshold and cleanup levels are 66 mg/kg. Zinc concentrations ranged from 68 mg/kg in LCBSS10 to 120 mg/kg in LCBSS02. Zinc was detected above the cleanup level in nine samples.

All barium results exceeded the screening level of 54 mg/kg. Barium exceeded the cleanup level of 320 mg/kg in all samples analyzed except for the fixed lab result for sample LCBSS10. Barium concentrations ranged from 390 mg/kg at LCBR60 to 940 mg/kg at LCBBR73.

Copper was detected above the threshold and cleanup levels (43 mg/kg) in LCBBR73 at 190 mg/kg.

A.2 Lobos Creek Protected Range

During the SI, samples were collected from 35 locations at LCPR, using hand augers or hand trowels. Previous sample locations and exceedances of screening, threshold, and cleanup levels are shown on Figure A-2. As shown on Figure A-2, all locations had exceedances above the cleanup levels. A total of 53 samples were analyzed from depths of 0.3 feet and 1.0 foot. A jackhammer was used to sample beneath the asphalt where needed. Historical results for these samples are presented in Table A-2. No ammunition artifacts were collected at the LCPR during the SI.

The screening level for lead in beach/dune sand (21 mg/kg) was exceeded at nine sample locations. Concentrations ranged from 21 mg/kg in LCRSS11 to 41 mg/kg in LCRBR66. The beach/dune sand threshold level of 57 mg/kg for lead was exceeded at six locations. Concentrations ranged from 57 mg/kg at LCRBR67 to 120 mg/kg at LCRBR16. Lead was detected above the applicable cleanup level (160 mg/kg) at two locations. In LCRSS16, lead was detected at 883 mg/kg by fixed laboratory analysis and at 520 mg/kg by XRF analysis. In LCBR74, lead was detected at 210 mg/kg by XRF analysis and at 116 mg/kg by fixed lab analysis.

Zinc was detected above the screening level (42 mg/kg) in 22 samples at concentrations ranging from 50 mg/kg to 65 mg/kg in LCRBR69. The threshold level for zinc (66 mg/kg) in beach/dune sand equals the cleanup level. This level was exceeded in 11 samples. Concentrations ranged from 71 mg/kg in samples LCRBR70 and LCRBR74 to 730 mg/kg in LCRSS16. The cleanup level for zinc (66 mg/kg) was exceeded in 11 samples. Zinc concentrations ranged from 70 mg/kg at LCRBR75 to 730 mg/kg at LCRSS16.

All barium results exceeded the screening level of 54 mg/kg. Barium was detected above the threshold concentration for beach/dune sand (120 mg/kg) in all samples analyzed. Barium was detected above the cleanup level (320 mg/kg) at all but one location, LCBR74. The highest concentration of barium was detected at LCBR61 at a concentration of 580 mg/kg.

The beach/dune sand screening, threshold, and cleanup levels for copper and antimony are below the laboratory detection limits. Therefore, the presence and concentrations of these metals could not be established using the SI data.

A.3 Machine Gun Butt

During the SI, samples were collected from 13 locations at the MGB as shown on Figure A-3. All locations had exceedances above the cleanup levels. A total of 24 samples were analyzed from depths of 0.3 feet to 1.0 feet. A single bullet was discovered at sample location 637BR66.

The lithology at this site includes both serpentinite and beach/dune sand. Figure A-3 depicts the exceedances compared with screening, threshold and cleanup levels, in this case, for beach/dune sand, since these are the most stringent. Table A-3 summarizes all previous results and comparison criteria for both lithologies. Because of the dense vegetation, a backhoe was used to clear some areas on the hillside for sampling. Cleanup levels were exceeded at all SI sampling locations.

The screening level for lead in beach/dune sand and serpentinite (21 mg/kg) was exceeded at 15 sample locations. The highest concentration was found in 637BR64 at 55 mg/kg. Lead was detected above the threshold limit for beach/dune sand (57 mg/kg) at sample locations 637BR63, 637BR65, 637BR66, and 637BR69. Concentrations ranged from 67 mg/kg at 637BR63 to 92 mg/kg at 637BR65. Lead was detected above the cleanup level for serpentinite and beach/dune sand (160 mg/kg) in sample 637BR66 (0.3 feet) at concentrations of 303 mg/kg by fixed lab analysis and 340 mg/kg by XRF analysis.

Six zinc concentrations exceed the screening level of 42 mg/kg. These results range from 59 mg/kg at 637BR60 to 64 mg/kg at both 637BR64 and 637BR71. Zinc was detected above the cleanup level for beach/dune sand (66 mg/kg) at 12 locations. Concentrations ranged from 72 mg/kg in 637BR61 to 1,100 mg/kg in 637BR70.

Barium was detected above the screening levels in one sample at 66 mg/kg, and above the cleanup level for serpentinite and beach/dune sand (320 mg/kg) in the remaining 18 samples analyzed, with concentrations ranging from 400 mg/kg at 637BR65 to 770 mg/kg in 637BR68.

The beach/dune sand threshold levels for antimony and copper are below the laboratory detection limit. Therefore, the presence and concentrations of these metals could not be established using the SI data.

A.4 California Highway Patrol Pistol Range

Samples were collected from 28 locations at the CHP using hand augers and trowels during the SI (Figure A-4). A total of 36 bullets and one shotgun shell were collected and logged during the SI sampling activities. Thirteen bullets were collected from sample location CHPBR63, 14 bullets and 1 shotgun shell from CHPBR64, and 10 bullets from CHPBR71. Table A-4 compares the historical sample results to the applicable screening, threshold, and cleanup levels for serpentinite lithology. As shown on Figure A-4, previous sampling results exceed cleanup levels at all SI sampling locations.

The screening level for lead (21 mg/kg) was exceeded at 12 sample locations from 27 mg/kg at CHPBR65 to 54 mg/kg at CHPBR71. The threshold level for lead (66 mg/kg) was exceeded at 11 locations with concentrations ranging from 67 mg/kg to 130 mg/kg. Lead exceeding the cleanup level of 160 mg/kg was detected in SI samples located at the backstop and outside the firing range boundary. Lead was also detected in samples above the cleanup level located near the Golden Gate Bridge Maintenance Yard (Maintenance Yard) (CHPSS03, CHPSS05, and CHPSS06). Lead concentrations exceeding the cleanup level ranged from 160 mg/kg in sample CHPBR73 (1.0 foot) up to 6,660 mg/kg in CHPSS03 (0.3 feet).

Lead contamination at the CHP is inconsistent in samples obtained from 0.3 feet and 1.0 foot (specifically, in several cases the lead concentrations increase with depth). In order to evaluate whether the Maintenance Yard was a source which may be contributing to the lead found in soil in the site vicinity, existing information from previous sampling events conducted at the Maintenance Yard were reviewed. In November 1999, PES Environmental completed a *Phase II Remedial Investigation Report for Lead and Zinc-Affected Soils for the Golden Gate Bridge in San Francisco and Marin Counties, California*. This report was prepared on behalf of the Golden Gate Bridge, Highway and Transportation District (GGBHTD). The objectives of this report were to help determine the extent of lead and zinc affected soils from paint coating operations that protect the Golden Gate Bridge from rusting (PES Environmental, 1999).

Sample locations from subarea SL-2 overlapped areas of the CHP SI sampling by Montgomery Watson. Samples were collected at depths of one to nine inches. Lead was detected above the cleanup level (300 mg/kg) in five out of 15 samples analyzed. Concentrations ranged from 441 mg/kg to 1,005 mg/kg. Zinc was detected above the cleanup level in all of the samples analyzed. Concentrations ranged from 147 mg/kg to 646 mg/kg. Most other locations from the GGBHTD sampling did not overlap closely with samples taken during the Montgomery Watson SI although the highest detection of zinc overlapped closely with the SI sample CHPSS07. SI samples near the GGBHTD at CHPSS05 (0.3 feet) and CHPSS07 (0.3 feet) had elevated concentrations of barium, copper, lead and zinc.

The screening level for zinc (86 mg/kg) was exceeded at 18 locations. These concentrations ranged from 89 mg/kg in CHPBR74 to 140 mg/kg in CHPBR63. Zinc concentrations exceeded the threshold and cleanup level for serpentinite (160 mg/kg) in 15 locations sampled with concentrations ranging from 160 mg/kg at CHPBR64 and CHPBR67 to 1,200 mg/kg in CHPSS05.

One fixed laboratory barium result for sample CHPBR73 (1.0 foot) at 46 mg/kg was below the comparison criteria. All other barium detections exceeded the screening level of 100 mg/kg and the threshold level of 230 mg/kg. Barium was detected above the cleanup level for serpentinite (320 mg/kg) in all samples analyzed by XRF. Concentrations ranged from 424 mg/kg in CHPBR60, CHPBR65 and CHPSS08 to 840 mg/kg in CHPSS05.

The screening level for copper (18 mg/kg) was exceeded by the 50 mg/kg detection limit for the majority of the samples and by all detected concentrations. Copper was detected above the threshold and cleanup levels for serpentinite (85 mg/kg) in five samples at concentrations ranging from 94 mg/kg at CHPBR67 and 2,900 mg/kg at CHPSS05.

A.5 Barnard Avenue Protected Range

This site was included in Montgomery Watson's 1996 *Site-Specific Workplan for the Small Arms Firing Ranges*, but was eliminated because the range was overlain by Landfill E. The 1997 RI prepared by Dames & Moore for the Army included sampling at Landfill E, but sampling activities did not specifically include the BAPR (Dames & Moore, 1997). Sample locations from the historical sampling activities at Landfill E are shown on Figure A-5. The possible presence of firing range impacts to soil beneath Landfill E is being considered as part of the Main Installation Sites FS.

Table A-1
Historical Metals Results
Lobos Creek Target Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

Metal				ANTIMONY ¹	BARIUM	COPPER ²	LEAD	ZINC
Screening Level	Beach/ Dune Sand			3.0	54	21	21	42
Threshold Level	Beach/ Dune Sand			3.0	120	43	57	66
Cleanup Level	Beach /Dune Sand			5.0	320	43	160	66
Location ID	Sample Depth	Sample Date	Analytical Method					
LCBBR60	0.3	2/22/96	XRF	<50	390	<50	19	<50
LCBBR60	1.0	2/22/96	XRF	<50	480	<50	<10	56
LCBBR61	0.3	2/22/96	SW6010	--	--	--	11	--
LCBBR61	0.3	2/22/96	XRF	<50	460	<50	<10	<50
LCBBR61	1.0	2/22/96	XRF	<50	410	<50	<10	<50
LCBBR62	0.3	2/22/96	XRF	<50	400	<50	20	<50
LCBBR62	1.0	2/22/96	XRF	<50	470	<50	17	<50
LCBBR63	0.3	2/22/96	XRF	<50	430	<50	<10	<50
LCBBR63	1.0	2/22/96	XRF	<50	440	<50	<10	<50
LCBBR64	0.3	2/22/96	XRF	<50	460	<50	11	<50
LCBBR64	1.0	2/22/96	XRF	<50	460	<50	<10	<50
LCBBR65	0.3	2/22/96	XRF	<50	500	<50	35	<50
LCBBR65	1.0	2/22/96	XRF	<50	480	<50	26	<50
LCBBR66	0.3	2/22/96	XRF	<50	470	<50	41	59
LCBBR66	1.0	2/22/96	XRF	<50	420	<50	42	<50
LCBBR67	0.3	2/22/96	XRF	<50	450	<50	<10	<50
LCBBR67	1.0	2/22/96	XRF	<50	410	<50	13	<50
LCBBR68	0.3	2/22/96	XRF	<50	440	<50	36	<50
LCBBR68	1.0	2/22/96	SW6010	--	--	--	<3	--
LCBBR68	1.0	2/22/96	XRF	<50	490	<50	<10	<50
LCBBR69	0.3	2/22/96	XRF	<50	490	<50	<10	<50
LCBBR69	1.0	2/22/96	XRF	<50	440	<50	11	<50
LCBBR70	0.3	2/22/96	XRF	<50	430	<50	11	<50
LCBBR70	1.0	2/22/96	XRF	<50	460	<50	12	<50
LCBBR71	0.3	2/22/96	XRF	<50	400	<50	40	85
LCBBR72	0.3	2/22/96	XRF	<50	520	<50	<10	90
LCBBR73	0.3	2/22/96	XRF	<50	940	190	10	77
LCBBR74	0.5	2/22/96	SW6010	--	--	--	33	--
LCBBR74	0.5	2/22/96	XRF	<50	430	<50	56	70
LCBBR75	1.0	2/22/96	XRF	<50	470	<50	15	<50
LCBBR76	0.3	2/23/96	XRF	<50	440	<50	88	<50
LCBBR76	1.0	2/23/96	SW6010	--	--	--	16	--
LCBBR76	1.0	2/23/96	XRF	<50	470	<50	32	<50
LCBBR77	0.3	2/23/96	XRF	<50	470	<50	108	73
LCBBR77	1.0	2/23/96	XRF	<50	520	<50	81	55
LCBBR78	0.3	2/23/96	XRF	<50	410	<50	41	<50
LCBBR78	1.0	2/23/96	XRF	<50	410	<50	86	<50
LCBBR80	1.0	2/23/96	SW6010	--	--	--	136	--

Table A-1
Historical Metals Results
Lobos Creek Target Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

Metal				ANTIMONY ¹	BARIUM	COPPER ²	LEAD	ZINC
Screening Level	Beach/ Dune Sand			3.0	54	21	21	42
Threshold Level	Beach/ Dune Sand			3.0	120	43	57	66
Cleanup Level	Beach /Dune Sand			5.0	320	43	160	66
Location ID	Sample Depth	Sample Date	Analytical Method					
LCBRR80	1.0	2/23/96	XRF	<50	520	<50	160	73
LCBSS01	0.3	2/22/96	SW6010	--	--	--	47	--
LCBSS01	0.3	2/22/96	XRF	<50	480	<50	54	110
LCBSS02	0.3	2/22/96	SW6010	--	--	--	171	--
LCBSS02	0.3	2/22/96	XRF	<50	630	<50	230	120
LCBSS03	0.3	2/22/96	XRF	<50	480	<50	<10	<50
LCBSS04	0.3	2/22/96	XRF	<50	420	<50	<10	<50
LCBSS05	0.3	2/22/96	XRF	<50	490	<50	23	<50
LCBSS06	0.3	2/22/96	XRF	<50	400	<50	<10	<50
LCBSS07	0.3	2/22/96	XRF	<50	520	<50	35	65
LCBSS08	0.3	2/22/96	XRF	<50	470	<50	37	<50
LCBSS09	0.3	2/22/96	XRF	<50	410	<50	14	56
LCBSS10	0.3	2/22/96	SW6010	--	102	--	36	--
LCBSS10	0.3	2/22/96	XRF	<50	700	<50	65	68
LCBSS11	1.0	2/22/1996	XRF	<50	450	<50	38	<50
LCBSS12	0.3	2/22/1996	XRF	<50	430	<50	<10	<50

Notes

Green indicates concentrations above screening level.

Blue indicates concentrations above threshold level.

Red indicates concentrations above cleanup level.

All concentrations reported in milligrams per kilogram (mg/kg).

Screening, threshold, and cleanup levels from *Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water* (EKI, 2002).

XRF - Energy dispersive X-Ray Fluorescence

SW6010 - Analytical Method 6010 using ICP Analysis

-- - Not analyzed

¹Detection Limit for Antimony is 50 mg/kg, therefore results are not conclusive.

²Detection Limit for Copper is 50 mg/kg, therefore results are not conclusive.

Table A-2
Historical Metals Results
Lobos Creek Protected Range
Small Arms Firing Ranges
Presidio of San Francisco, California

Metal				ANTIMONY ¹ mg/kg	BARIUM mg/kg	COPPER ² mg/kg	LEAD mg/kg	ZINC mg/kg
Screening Level	Beach/Dune Sand			3.0	54	21	21	42
Threshold Level	Beach /Dune Sand			3.0	120	43	57	66
Cleanup Level	Beach/ Dune Sand			5.0	320	43	160	66
Location ID	Sample Depth	Sample Date	Analytical Method					
LCRSS01	0.3	2/23/96	XRF	<50	420	<50	18	73
LCRSS02	0.3	2/23/96	XRF	<50	420	<50	22	56
LCRSS03	0.3	2/23/96	SW6010	--	--	--	13	--
LCRSS03	0.3	2/23/96	XRF	<50	500	<50	18	50
LCRSS04	0.3	2/23/96	XRF	<50	460	<50	23	<50
LCRSS05	0.3	2/23/96	XRF	<50	470	<50	11	50
LCRSS06	0.3	2/23/96	XRF	<50	450	<50	<10	62
LCRSS07	0.3	2/23/96	XRF	<50	360	<50	<10	51
LCRSS10	0.3	2/23/96	XRF	<50	450	<50	13	58
LCRSS11	0.3	2/23/96	XRF	<50	420	<50	21	58
LCRSS12	0.3	2/23/96	XRF	<50	410	<50	15	61
LCRSS13	0.3	2/23/96	XRF	<50	450	<50	<10	120
LCRSS14	0.3	2/23/96	SW6010	--	--	--	<3	--
LCRSS14	0.3	2/23/96	XRF	<50	420	<50	<10	58
LCRSS15	0.3	2/23/96	XRF	<50	450	<50	22	110
LCRSS16	0.3	2/23/96	SW6010	--	--	--	83	--
LCRSS16	0.3	2/23/96	XRF	<50	470	<50	120	730
LCRSS17	0.3	2/23/96	XRF	<50	390	<50	30	79
LCRSS18	0.3	2/23/96	XRF	<50	400	<50	14	<50
LCRSS19	0.3	2/23/96	XRF	<50	460	<50	14	56
LCRBR60	0.3	2/23/96	XRF	<50	430	<50	<10	<50
LCRBR60	1.0	2/23/96	XRF	<50	500	<50	<10	<50
LCRBR61	0.3	2/23/96	XRF	<50	580	<50	13	56
LCRBR61	1.0	2/23/96	XRF	<50	500	<50	<10	<50
LCRBR62	0.3	2/23/96	XRF	<50	440	<50	23	50
LCRBR62	1.0	2/23/96	XRF	<50	520	<50	<10	<50
LCRBR63	0.3	2/23/96	XRF	<50	400	<50	36	<50
LCRBR63	1.0	2/23/96	XRF	<50	460	<50	<10	<50
LCRBR64	0.3	2/23/96	XRF	<50	480	<50	16	<50
LCRBR64	1.0	2/23/96	XRF	<50	470	<50	<10	<50
LCRBR65	0.3	2/23/96	XRF	<50	480	<50	<10	<50
LCRBR65	1.0	2/23/96	XRF	<50	420	<50	<10	<50
LCRBR66	0.3	2/23/96	XRF	<50	460	<50	41	62
LCRBR66	1.0	2/23/96	XRF	<50	440	<50	14	<50
LCRBR67	0.3	2/23/96	SW6010	--	--	--	883	--
LCRBR67	0.3	2/23/96	XRF	<50	460	<50	520	<50
LCRBR67	1.0	2/23/96	SW6010	--	--	--	57	--
LCRBR67	1.0	2/23/96	XRF	<50	370	<50	<10	<50
LCRBR68	0.3	2/23/96	XRF	<50	400	<50	16	<50

Table A-2
Historical Metals Results
Lobos Creek Protected Range
Small Arms Firing Ranges
Presidio of San Francisco, California

Metal				ANTIMONY ¹ mg/kg	BARIUM mg/kg	COPPER ² mg/kg	LEAD mg/kg	ZINC mg/kg
Screening Level	Beach/Dune Sand			3.0	54	21	21	42
Threshold Level	Beach /Dune Sand			3.0	120	43	57	66
Cleanup Level	Beach/ Dune Sand			5.0	320	43	160	66
Location ID	Sample Depth	Sample Date	Analytical Method					
LCRBR68	1.0	2/23/96	XRF	<50	490	<50	<10	<50
LCRBR69	0.3	2/28/96	XRF	<50	340	<50	<10	65
LCRBR69	1.0	2/28/96	XRF	<50	410	<50	11	<50
LCRBR70	0.3	2/28/96	SW6010	--	--	--	10	--
LCRBR70	0.3	2/28/96	XRF	<50	380	<50	12	71
LCRBR70	1.0	2/28/96	SW6010	--	--	--	<3	--
LCRBR70	1.0	2/28/96	XRF	<50	340	<50	<10	<50
LCRBR71	0.3	2/28/96	XRF	<50	440	<50	12	63
LCRBR71	1.0	2/28/96	XRF	<50	330	<50	<10	61
LCRBR72	0.3	2/28/96	XRF	<50	380	<50	14	59
LCRBR72	1.0	2/28/96	XRF	<50	420	<50	<10	50
LCRBR73	0.3	2/28/96	XRF	<50	360	<50	35	76
LCRBR73	1.0	2/28/96	XRF	<50	440	<50	<10	54
LCRBR74	0.3	2/28/96	SW6010	--	49	--	116	--
LCRBR74	0.3	2/28/96	XRF	<50	310	<50	210	200
LCRBR74	1.0	2/28/96	XRF	<50	450	<50	<10	71
LCRBR75	0.3	2/28/96	XRF	<50	440	<50	<10	70
LCRBR75	1.0	2/28/96	XRF	<50	420	<50	<10	55
LCRBR76	0.3	2/28/96	SW6010	--	--	--	67	--
LCRBR76	0.3	2/28/96	XRF	<50	380	<50	85	130
LCRBR76	1.0	2/28/96	XRF	<50	400	<50	<10	50
LCRBR77	0.3	2/28/96	XRF	<50	570	<50	33	<50
LCRBR77	1.0	2/28/96	XRF	<50	430	<50	<10	55

Notes

Green indicates concentrations above screening level.

Blue indicates concentrations above threshold level.

Red indicates concentrations above cleanup level.

All concentrations reported in milligrams per kilogram (mg/kg).

Screening, threshold, and cleanup levels from *Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water* (EKI, 2002).

XRF - Energy dispersive X-Ray Fluorescence

SW6010 - Analytical Method 6010 using ICP Analysis

-- - Not analyzed

¹Detection Limit for Antimony is 50 mg/kg, therefore results are not conclusive.

²Detection Limit for Copper is 50 mg/kg, therefore results are not conclusive.

Table A-3
Historical Metals Results
Machine Gun Butt
Small Arms Firing Ranges
Presidio of San Francisco, California

Metal				ANTIMONY ¹	BARIUM	COPPER ²	LEAD	ZINC
Screening Level	Serpentinite			3.0	100	18	21	86
	Beach/ Dune Sand			3.0	54	21	21	42
Threshold Level	Serpentinite			3	230	85	66	160
	Beach/ Dune Sand			3	120	43	57	66
Cleanup Level	Serpentinite			5	320	85	160	160
	Beach/ Dune Sands			5	320	43	160	66
Location ID	Sample Depth	Sample Date	Analytical Method					
637BR60	0.3	2/27/96	XRF	<50	560	<50	10	59
637BR61	0.3	2/27/96	XRF	<50	530	<50	15	72
637BR62	0.3	2/27/96	XRF	<50	520	<50	29	60
637BR62	1.0	2/27/96	XRF	<50	470	<50	27	79
637BR63	0.3	2/27/96	XRF	<50	410	<50	67	95
637BR63	1.0	2/27/96	XRF	<50	430	<50	19	84
637BR64	0.3	2/27/96	XRF	<50	460	<50	55	63
637BR64	1.0	2/27/96	XRF	<50	530	<50	24	64
637BR65	0.3	2/27/96	XRF	<50	400	<50	92	91
637BR65	1.0	2/27/96	XRF	<50	420	<50	31	82
637BR66	0.3	3/13/96	SW6010	--	66	--	303	--
637BR66	0.3	3/13/96	XRF	<50	510	<50	340	76
637BR66	1.0	3/14/96	XRF	<50	560	<50	84	85
637BR67	0.3	3/14/96	XRF	<50	610	<50	24	60
637BR67	1.0	3/14/96	XRF	<50	600	<50	32	84
637BR68	0.3	3/13/96	SW6010	--	--	--	29	--
637BR68	0.3	3/13/96	XRF	<50	770	<50	51	120
637BR68	1.0	3/14/96	XRF	<50	540	<50	18	<50
637BR69	0.3	3/13/96	SW6010	--	--	--	66	--
637BR69	0.3	3/13/96	XRF	<50	510	<50	37	600
637BR69	1.0	3/14/96	XRF	<50	550	<50	72	160
637BR70	0.3	3/13/96	SW6010	--	--	--	29	--
637BR70	0.3	3/13/96	XRF	<50	530	<50	51	1,100
637BR70	1.0	3/14/96	XRF	<50	530	<50	29	700
637BR71	0.3	3/14/96	XRF	<50	550	<50	13	64
637BR71	1.0	3/14/96	XRF	<50	530	<50	40	330
637BR72	0.3	3/14/96	XRF	<50	540	<50	35	720
637BR72	1.0	3/14/96	XRF	<50	630	<50	18	170

Notes

Green indicates concentrations above screening level.

Blue indicates concentrations above threshold level.

Red indicates concentrations above cleanup level.

All concentrations reported in milligrams per kilogram (mg/kg).

Screening, threshold, and cleanup levels from *Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water* (EKL 2002).

XRF - Energy dispersive X-Ray Fluorescence

SW6010 - Analytical Method 6010 using ICP Analysis

-- - Not analyzed

¹ Detection Limit for Antimony is 50 mg/kg, therefore results are not conclusive.

² Detection Limit for Copper is 50 mg/kg, therefore results are not conclusive.

Table A-4
Historical Metals Results
California Highway Patrol Pistol Range
Small Arms Firing Ranges
Presidio of San Francisco, California

Metal				ANTIMONY	BARIUM	COPPER	LEAD	ZINC
Screening Level	Serpentinite			3.0	100	18	21	86
Threshold Level	Serpentinite			3.0	230	85	66	160
Cleanup Level	Serpentinite			5.0	320	85	160	160
Location ID	Sample Depth	Sample Date	Analytical Method					
CHPBR60	0.3	2/28/96	XRF	<50	530	<50	540	220
CHPBR60	1.0	3/4/96	XRF	<50	430	<50	350	120
CHPBR61	0.3	2/28/96	XRF	<50	530	<50	490	200
CHPBR61	1.0	3/4/96	XRF	<50	500	<50	270	57
CHPBR62	0.3	2/28/96	XRF	<50	470	<50	400	110
CHPBR62	1.0	2/28/96	XRF	<50	480	<50	660	130
CHPBR62	2.0	3/4/96	XRF	<50	590	120	4,500	95
CHPBR62	3.0	3/6/96	XRF	<50	640	60	860	75
CHPBR62	4.0	3/13/96	SW6010	--	--	--	316	--
CHPBR62	4.0	3/13/96	XRF	<50	490	<50	380	75
CHPBR63	0.3	2/28/96	XRF	<50	470	<50	830	140
CHPBR63	1.0	2/28/96	XRF	<50	530	<50	610	97
CHPBR63	2.0	3/4/96	SW6010	--	--	--	6	--
CHPBR63	2.0	3/4/96	XRF	<50	480	<50	14	<50
CHPBR64	0.3	2/28/96	XRF	<50	530	<50	1,200	160
CHPBR64	1.0	2/28/96	SW6010	--	--	--	213	--
CHPBR64	1.0	2/28/96	XRF	<50	460	<50	210	62
CHPBR65	0.3	2/28/96	XRF	<50	430	<50	37	55
CHPBR65	1.0	2/28/96	SW6010	--	--	--	19	--
CHPBR65	1.0	2/28/96	XRF	<50	530	<50	33	60
CHPBR66	0.3	3/4/96	XRF	<50	450	<50	49	90
CHPBR66	1.0	3/4/96	XRF	<50	440	<50	51	56
CHPBR67	0.3	3/4/96	XRF	<50	580	94	1,500	310
CHPBR67	1.0	3/4/96	XRF	<50	510	<50	830	160
CHPBR67	2.0	3/15/96	SW6010	--	--	--	34	--
CHPBR68	0.3	3/4/96	XRF	<50	560	51	2,800	210
CHPBR68	1.0	3/4/96	XRF	<50	530	74	2,800	130
CHPBR68	2.0	3/6/96	SW6010	--	--	--	186	--
CHPBR68	2.0	3/6/96	XRF	<50	460	<50	240	63
CHPBR69	0.3	3/4/96	XRF	<50	530	<50	38	66
CHPBR69	1.0	3/4/96	XRF	<50	520	<50	49	54
CHPBR70	0.3	3/4/96	XRF	<50	450	<50	180	54
CHPBR70	1.0	3/4/96	XRF	<50	500	<50	100	67
CHPBR71	0.3	3/4/96	XRF	<50	520	<50	920	96
CHPBR71	1.0	3/4/96	XRF	<50	470	<50	1,200	67
CHPBR71	2.0	3/15/96	SW6010	--	--	--	54	--
CHPBR72	0.3	3/4/96	XRF	<50	540	52	630	360
CHPBR72	1.0	3/4/96	SW6010	--	--	--	536	--
CHPBR72	1.0	3/4/96	XRF	<50	530	<50	390	180
CHPBR72	2.0	4/11/96	200.7	--	--	--	48	--

Table A-4
Historical Metals Results
California Highway Patrol Pistol Range
Small Arms Firing Ranges
Presidio of San Francisco, California

Metal				ANTIMONY	BARIUM	COPPER	LEAD	ZINC
Screening Level	Serpentinite			3.0	100	18	21	86
Threshold Level	Serpentinite			3.0	230	85	66	160
Cleanup Level	Serpentinite			5.0	320	85	160	160
Location ID	Sample Depth	Sample Date	Analytical Method					
CHPBR73	0.3	3/4/96	XRF	<50	520	<50	550	180
CHPBR73	1.0	3/4/96	SW6010	--	46	--	160	--
CHPBR73	1.0	3/4/96	XRF	<50	600	<50	210	83
CHPBR74	0.3	3/4/96	XRF	<50	500	<50	100	73
CHPBR74	1.0	3/4/96	XRF	<50	460	<50	92	57
CHPBR75	0.3	3/6/96	XRF	<50	490	<50	170	81
CHPBR75	1.0	3/6/96	XRF	<50	580	<50	83	74
CHPBR76	0.3	3/6/96	XRF	<50	590	<50	330	120
CHPBR76	1.0	3/6/96	XRF	<50	560	<50	130	74
CHPBR77	0.3	3/8/96	XRF	<50	480	<50	170	130
CHPBR77	1.0	3/8/96	XRF	<50	490	<50	85	130
CHPBR78	0.3	3/8/96	XRF	<50	510	<50	210	130
CHPBR78	1.0	3/8/96	XRF	<50	580	<50	210	120
CHPBR79	0.3	3/8/96	XRF	<50	570	<50	380	160
CHPBR79	1.0	3/8/96	XRF	<50	510	<50	95	190
CHPSS01	0.3	2/28/96	XRF	<50	480	160	73	300
CHPSS02	0.3	2/28/96	XRF	<50	570	<50	1,200	200
CHPSS03	0.3	3/4/96	SW6010	--	424	--	6,660	--
CHPSS03	0.3	3/4/96	XRF	<50	830	<50	3,300	210
CHPSS03	1.0	3/4/96	XRF	<50	610	<50	67	150
CHPSS04	0.3	3/6/96	XRF	<50	490	<50	41	84
CHPSS05	0.3	3/6/96	XRF	<50	840	2,900	5,800	1,200
CHPSS06	0.3	3/6/96	XRF	<50	670	71	120	100
CHPSS07	0.3	3/8/96	XRF	<50	720	120	100	110
CHPSS07	1.0	3/8/96	XRF	<50	530	<50	32	89
CHPSS08	0.3	3/8/96	XRF	<50	430	<50	21	62
CHPSS08	1.0	3/8/96	XRF	<50	560	<50	27	62

Notes

Green indicates concentrations above screening level.

Blue indicates concentrations above threshold level.

Red indicates concentrations above cleanup level.

All concentrations reported in milligrams per kilogram (mg/kg).

Screening, threshold, and cleanup levels from *Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water* (EKL, 2002).

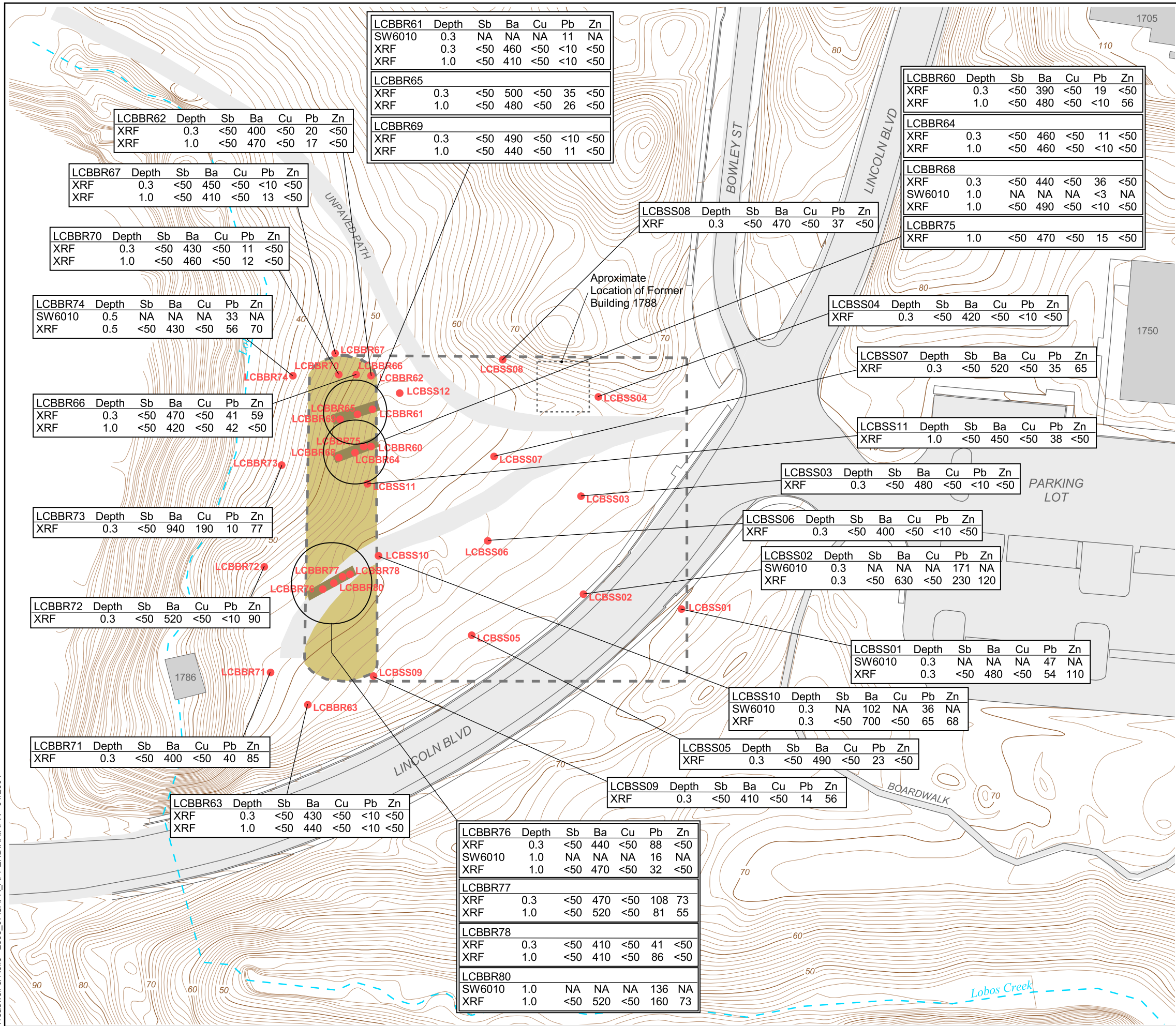
XRF - Energy dispersive X-Ray Fluorescence

SW6010 - Analytical Method 6010 using ICP Analysis

-- - Not analyzed

¹Detection Limit for Antimony is 50 mg/kg, therefore results are not conclusive.

²Detection Limit for Copper is 50 mg/kg, therefore results are not conclusive.



N

80

0

80 Feet

● LCBSS06

Sample Location from Montgomery Watson 1997 SI with results exceeding cleanup levels

Firing Range Boundary from Montgomery Watson 1997 SI

Creek

Presidio Base Map

Topographic Contours (Contour Interval : 10 ft)

Soil Berm

Trench

Former Building

Building and Number

Beach Dune Sand	Sb	Ba	Cu	Pb	Zn
Screening Level	3.0	54	21	21	42
Threshold Level	3.0	120	43	57	66
Cleanup Level	5.0	320	43	160	66

Notes:
Results reported in milligrams per kilogram (mg/kg).
All sample depths reported in feet.

Screening, threshold and cleanup levels from Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water (EKI, 2002b)

NA - Not Analyzed
Sb - Antimony
Ba - Barium
Cu - Copper
Pb - Lead
Zn - Zinc

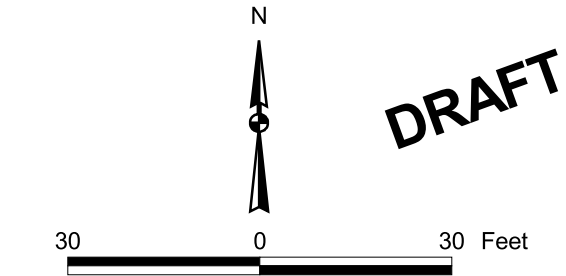
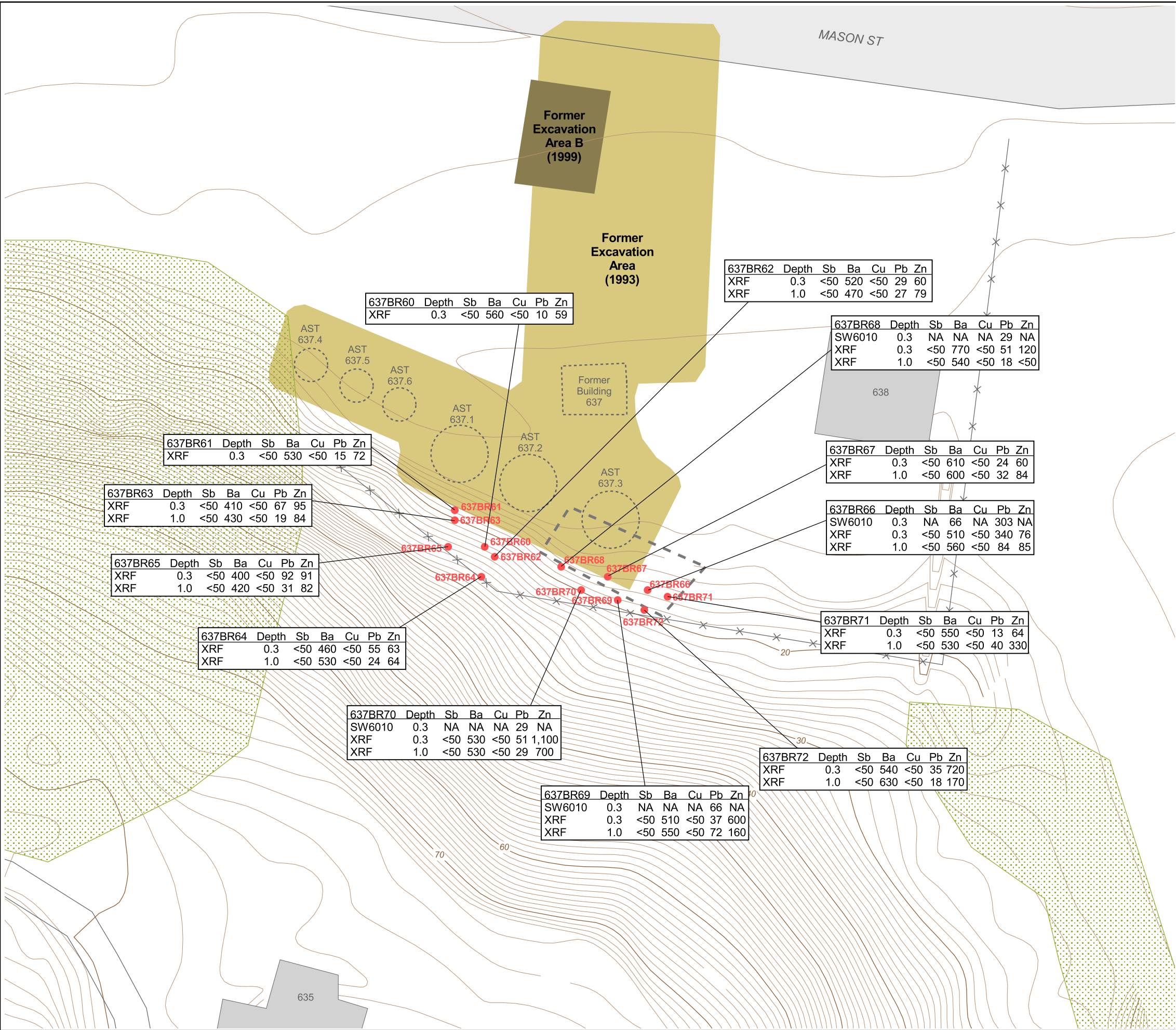
Base map was provided by the Presidio Trust in June 2003.
Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

LOBOS CREEK
TARGET BUTT PREVIOUS
SAMPLING EXCEEDANCES

Treadwell&Rollo

Presidio Trust
34 Graham Street
P.O. Box 29052
San Francisco, CA
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February 2004

FIGURE A-1



LEGEND

- **637BR66** Sample Location from Montgomery Watson 1997 SI with results exceeding cleanup levels
- Firing Range Boundary from Montgomery Watson 1997 SI
- × Fence Boundary
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- Former Above Ground Storage Tank
- Sensitive Habitat (NPS, 2001a)
- 638 Building and Number

Beach Dune Sand	Sb	Ba	Cu	Pb	Zn
Screening Level	3.0	54	21	21	42
Threshold Level	3.0	120	43	57	66
Cleanup Level	5.0	320	43	160	66

Notes:
Results reported in milligrams per kilogram (mg/kg).
All sample depths reported in feet.

Screening, threshold and cleanup levels from Development of Presidio-wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water (EKI, 2002b)

NA - Not Analyzed
Sb - Antimony
Ba - Barium
Cu - Copper
Pb - Lead
Zn - Zinc

Base map was provided by the Presidio Trust in June 2003.
Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

**MACHINE GUN BUTT
PREVIOUS SAMPLING EXCEEDANCES**

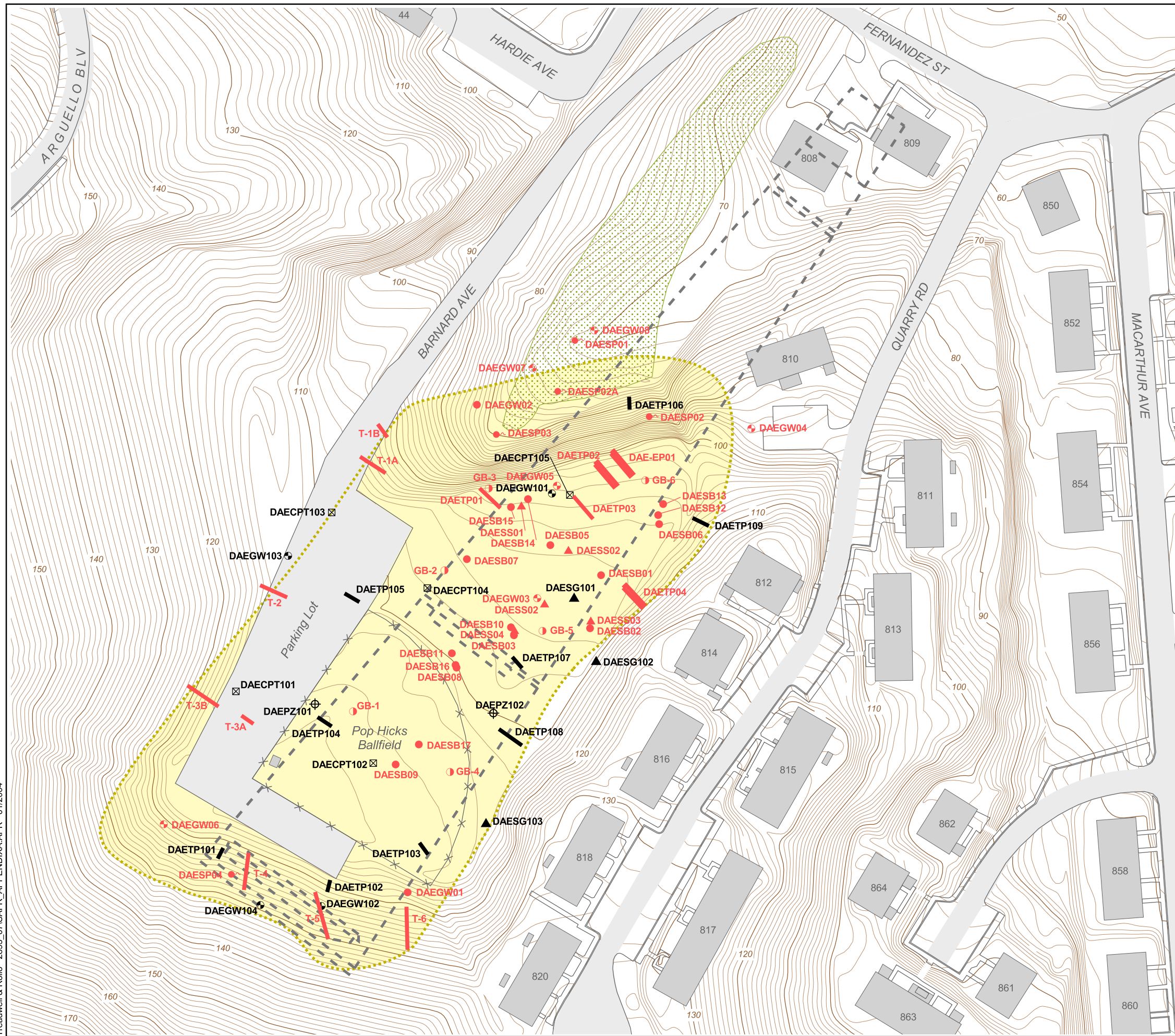
Treadwell & Rollo

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February 2004

FIGURE A-3



LEGEND

- DAEGW04 Army Groundwater Monitoring Well
- DAESB12 Army Soil Boring
- DAESS02 Army Surface Soil Sample
- DAESP04 Army Surface Water Sample
- GB-5 Army Geotechnical Soil Boring
- DAETP04 Army Test Pit or Trench
- DAECPT102 Trust CPT Location
- DAEPZ102 Trust Piezometer
- DAEGW104 Trust Groundwater Monitoring Well
- DAESG102 Trust Soil Gas Probe
- DAETP106 Trust Trench
- Firing Range Boundary from 1909 Map from NPS GGNRA Archives
- Presidio Base Map
- Topographic Contours (Contour Interval : 10 ft)
- Sensitive Habitat (NPS, 2001a)
- Landfill E Boundary from Draft Landfill E Field Sampling Report (EKI & Golder, 2003).
- 811 Building and Number

Notes:
Firing range effects beneath the landfill were investigated as part of the 2002 Landfill E investigation, and the results will be reported in the Draft Landfill E Field Sampling Report (EKI & Golder, 2003).

Base map was provided by the Presidio Trust in June 2003.

Horizontal Datum: NAD 27, CA State Plane Coordinates, Zone 3, feet
Vertical Datum: Presidio Lower Low Water (ft. PLLW)

BARNARD AVENUE PROTECTED RANGE AND LANDFILL E

Treadwell&Rollo



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February 2004

FIGURE A-5

APPENDIX B

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM			
Major Divisions		Symbols	Typical Names
Coarse-Grained Soils (more than half of soil > no. 200 sieve size)	Gravels (More than half of coarse fraction > no. 4 sieve size)	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (More than half of coarse fraction < no. 4 sieve size)	SW	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils (more than half of soil < no. 200 sieve size)	Silts and Clays LL = < 50	ML	Inorganic silts and clayey silts of low plasticity, sandy silts, gravelly silts
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	Silts and Clays LL = > 50	MH	Inorganic silts of high plasticity
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic silts and clays of high plasticity
Highly Organic Soils		PT	Peat and other highly organic soils

SAMPLE DESIGNATIONS/SYMBOLS

GRAIN SIZE CHART		
Classification	Range of Grain Sizes	
	U.S. Standard Sieve Size	Grain Size in Millimeters
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel coarse fine	3" to No. 4	76.2 to 4.76
	3" to 3/4"	76.2 to 19.1
	3/4" to No. 4	19.1 to 4.76
Sand coarse medium fine	No. 4 to No. 200	4.76 to 0.074
	No. 4 to No. 10	4.76 to 2.00
	No. 10 to No. 40	2.00 to 0.420
	No. 40 to No. 200	0.420 to 0.074
Silt and Clay	Below No. 200	Below 0.074



Sample taken with Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter. Darkened area indicates soil recovered



Classification sample taken with Standard Penetration Test sampler



Undisturbed sample taken with thin-walled tube



Disturbed sample



Sampling attempted with no recovery



Core sample



Analytical laboratory sample



Sample taken with Direct Push sampler



Unstabilized groundwater level



Stabilized groundwater level

SAMPLER TYPE

- C Core barrel
- CA California split-barrel sampler with 2.5-inch outside diameter and a 1.93-inch inside diameter
- D&M Dames & Moore piston sampler using 2.5-inch outside diameter, thin-walled tube
- O Osterberg piston sampler using 3.0-inch outside diameter, thin-walled Shelby tube

- PT Pitcher tube sampler using 3.0-inch outside diameter, thin-walled Shelby tube
- S&H Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter
- SPT Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside diameter and a 1.5-inch inside diameter
- ST Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure

SMALL ARMS FIRING RANGES
Presidio of San Francisco, California

CLASSIFICATION CHART

Treadwell&Rollo

Date 12/11/03 Project No. 2893.07 Figure B-0

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB01

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03



Coordinates: Northing: 475116.01
Easting: 1427425.4

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 69.86 feet ¹
1	LCBSB01-[0.3]			18/18		SW	SAND (SW) gray brown, loose, roots and pine needles at surface, narrow metal (not bullet) object found at 8-inches
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

B-1

PRESIDIO ENVIRONMENTAL LOG R1 289307.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB02

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475116.31
Easting: 1427330.1

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 67.27 feet ¹
1	LCBSB02-[1]			12/24		GP	SANDY GRAVEL (GP) gray, dense, sub-rounded to sub-angular
2	DUP			18/24		SW	SAND (SW) gray brown, moderately dense, moist, well graded, no odor Duplicate Soil Sample (DUP072403D)
3	[2.5]			18/24		SW	
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND

Boring terminated at 4 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure:

B-2

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB03

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 47514.84
Easting: 1427357.01

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 66.48 feet ¹
	LCBSB03-			24/24			6-inch Asphalt and Baserock
1	[1]					GW	CHERT GRAVEL (GW) red brown, moderately dense to dense, rounded to angular, well graded, no odor
						GP	SAND with GRAVEL (GP) gray brown, dry, well graded, no odor
2				18/24		SW	SAND (SW) gray brown, moist, rounded to angular, well graded, no odor
3	[2.5]						
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 4 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-3

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB04

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03



Coordinates: Northing: 475162.51
Easting: 1427357.85

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 66.49 feet ¹
1	LCBSB04-[0.3]			18/18		SM	SAND (SM) gray brown, loose, dry, well graded, less than 5 percent fines
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

B-4

PRESIDIO ENVIRONMENTAL LOG, R1 289307.GPJ, T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB05

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475167.86
Easting: 1427377.59

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 66.07 feet ¹
	LCBSB05-			24/		GP	SANDY GRAVEL (GP)
	[0.3]			24			gray
1						SP-SW	GRAVELLY SAND (SP-SW)
	[1]						gray brown, dense, dry, sub-rounded to sub-angular, less than 10 percent fines
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILE
DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

B-5

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB06

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475217.68
Easting: 1427424.57

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 64.99 feet ¹
	LCBSB06-			24/24			6-inches Asphalt and Baserock
1	[1]					GP	SAND with GRAVEL (GP) gray brown, moderately dense, no odor
2	[2]			24/24		SW	SAND (SW) gray brown, dense, moist, rounded to angular, well graded, no odor
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 4 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

B-6

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB07

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475270.36
Easting: 1427382.59

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 62.45 feet ¹
1	LCBSB07-[1]			24/24		GW	CHERT GRAVEL (GW) red brown, loose to moderately dense, dry
2	[2]					SW	SAND with GRAVEL (SW) gray brown, loose to moderately dense, dry to moist, sub-angular, less than 5 percent fines
3				24/24			
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND?

Boring terminated at 4 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure:

B-7

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB08

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475320.18
Easting: 1427427.07

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 66.48 feet ¹
1	LCBSB08-[0.3]			24/24		SW	2-inch Woody Debris and Grass SAND (SW) gray brown, loose, dry, well graded, fine roots and trace
2	[1]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND?

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure:

B-8

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB09

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03



Coordinates: Northing: 475324.87
Easting: 1427318.3

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 59.99 feet ¹
1	LCBSB09- [0.3]			18/ 18		SM	Organic layer dark brown, roots, partially decomposed leaves and woody debris SAND (SM) gray brown, loose, dry, well graded, roots, less than 5 percent fines
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

B-9

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB10

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475260.48
Easting: 1427285.93

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 60.27 feet ¹
1	LCBSB10- [0.5]			24/ 24			Organic material SAND (SW) gray brown, very loose, dry, well graded, no odor, trace fine roots
2	[1.5]					SW	
3				24/ 24			
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 4 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure:

B-10

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB11

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/24/03

Date finished: 7/24/03



Coordinates: Northing: 475217.98
Easting: 1427329.27

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 63.09 feet ¹
1	LCBSB11- [0.3]		24/ 24	24		SW	Vegetation grass SAND (SW) gray brown, very loose, dry, well graded, no odor, trace fine roots
2	[1]						moist
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

B-11

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB12

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03

Coordinates: Northing: 475167.37
Easting: 1427279.96

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 63.51 feet ¹
1	LCBSB12- [0.3]			18/ 18		SM	Organic layer dark brown, partially decomposed needles from pine tree SAND (SM) gray brown, loose, dry to moist, well graded
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

B-12

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB13

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/24/03

Date finished: 7/24/03



Coordinates: Northing: 475116.21
Easting: 1427229.65

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 63.83 feet ¹
1	LCBSB13- [0.3]			24/ 24		SW	SAND (SW) gray brown, very loose, dry, well graded, no odor, woody vegetation at surface with many fine roots
2	[1]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure:

B-13

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB14

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475167.04
Easting: 1427227.98

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 60.02 feet ¹
	LCBSB14-						Vegetation woody material
	[0.3]					GM	GRAVEL with CONCRETE (GM) FILL
							gray, dry, sub-rounded to angular, moderately graded, no odor
1						SW	SAND (SW)
	[1]						gray brown, dry, well graded, no odor
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB15

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475217.88
Easting: 1427228.82

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 60.52 feet ¹
1	LCBSB15-[1]			24/24		GW	Vegetation wood material CHERT GRAVEL (GW) red brown, moderately dense, dry, well graded, no odor
2	[2]						
3	DUP			24/24		SW	SAND (SW) gray brown, loose, dry, rounded to sub-angular, well graded, no odor moist at 1.5 feet Duplicate Soil Sample (DUP072403C)
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

B-15

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB16

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475269.54



Easting: 1427227.15

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 56.59 feet ¹
1	LCBSB16-[1]			24/24		SW	SAND (SW) gray brown, dry, well graded, trace wood
2	[2]						moist at 1.0 foot
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB17

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/31/03

Date finished: 7/31/03

Coordinates: Northing: 475314.974



Easting: 1427217.867

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 54.37 feet ¹
1	LCBSB17- [0.3]			18/ 18		SW	SAND (SW) gray brown, very loose, dry, well graded, no odor
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

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Figure:
B-17

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB18

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 475323.306



Easting: 1427148.458

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 46.71 feet ¹
1	LCBSB18- DUP [1]			36/ 36		SW	SAND (SW) gray brown, loose, well graded, 5 percent fines Duplicate Soil Sample (DUP073003E)
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB19

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475293.34
Easting: 1427177.85

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 58.45 feet ¹
1	LCBSB19-[1]			24/24		SW	SAND (SW) gray brown, very loose, dry, well graded, with fine roots, trace woody material moist at 1.0 feet
2	[2]			6/6			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB20

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 475263.78

Easting: 1427155.8

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 54.01 feet ¹
1	LCBSB20- DUP [1]			30/ 30		SW	SAND (SW) gray brown, very loose, dry, well graded, no odor Duplicate Soil Sample (DUP073003D)
2	[2] (MSD)						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB21

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475249.88


Easting: 1427175.66

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 61.82 feet ¹
1	LCBSB21-			6/6			Woody vegetation
	[1]						SAND (SW)
	DUP						gray brown, dry, no odor, fine roots
2				24/24		SW	Duplicate Soil Sample (DUP072403A)
	[2]						moist at 1.5 feet
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB22

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/31/03

Date finished: 7/31/03




Coordinates: Northing: 475231.099
Easting: 1427189.166

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 59.53 feet ¹
	LCBSB22-			6/6		PT	PEAT (PT) dark brown, loose, dry, no odor, with pine needles and leaves
1	[1]						DUNE SAND
2	[2]			24/24		SW	
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB23

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/24/03

Date finished: 7/24/03


Coordinates: Northing: 475193.4
Easting: 1427173.24

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 58.33 feet ¹
	LCBSB23-			6/6		GW	CHERT GRAVEL (GW) red brown, loose, dry, well graded, no odor
1	[1]			24/24		SW	SAND (SW) gray brown, loose, dry to moist, with fine to medium roots
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB24

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475184.24
Easting: 1427153.24

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 56.26 feet ¹
1	LCBSB24-[1]			24/24		GW	CHERT GRAVEL (GW) red brown, dry, sub-angular to angular, no odor, less than 5 percent fines
2	DUP					SW	SAND (SW) loose to moderately dense, dry to moist, well graded Duplicate Soil Sample (DUP072403B)
3	[2.5]						
4				18/24			
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 4 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB25

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/31/03

Date finished: 7/31/03

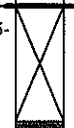

Coordinates: Northing: 475157.51
Easting: 1427176.18

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 60.27 feet ¹
1	LCBSB25-[1]			30/30		SW	SAND (SW) dark brown, moderately dense, dry, no odor, with leaves and pine needles
2	[2]						SAND (SW) gray brown, loose, dry, well graded, no odor
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB26

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/31/03

Date finished: 7/31/03

Coordinates: Northing: 475113.317
Easting: 1427184.581

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 62.03 feet ¹
1	LCBSB26-						SAND (SW) gray brown, loose to moderately dense, dry to moist, no odor, increasing moisture and density with depth
	[1] [MDS]						
2							Duplicate Soil Sample (DUP073103C)
	[2]						
3	DUP						
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 3 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB27

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475079.24
Easting: 1427171.57

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 62.82 feet ¹
1	LCBSB27- [0.3]			24/ 24		SW	SAND (SW) gray brown, moderately dense, dry to moist, well graded, no odor, many fine roots, grass surface cover
2	[1]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG, R1 289307.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB28

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475093.81
Easting: 1427134.75

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 59.22 feet ¹
1	LCBSB28- [0.3]			24/ 24		SW	SAND (SW) gray brown, loose to moderately dense, dry to moist, well graded, no odor
2	[1]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-28

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB29

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03



Coordinates: Northing: 475076.42
Easting: 1427118.1

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 59.05 feet ¹
1	LCBSB29- [0.3]			24/ 24		SW	SAND (SW) gray brown, loose to moderately dense, dry to moist, well graded, fine roots
2	[1]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG, R1 289307.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB30

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03




Coordinates: Northing: 475093.56
Easting: 1427091.24

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 53.51 feet ¹
1	LCBSB30- [0.3]			24/ 24		SW	SAND with GRAVEL (SW) gray brown, very loose to loose, dry, sub-angular, well graded
	[1]						
2	DUP						Duplicate Soil Sample (DUP073103B)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB31

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03



Coordinates: Northing: 475139.65
Easting: 1427134.07

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 56.77 feet ¹
1	LCBSB31- [0.3]			24/ 24		SW	SAND (SW) gray brown, loose, dry to moist, well graded, fine roots
2	[1]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB32

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03



Coordinates: Northing: 475159.53
Easting: 1427091.54

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 54.19 feet ¹
1	LCBSB32- [0.3] [MSD]			24/ 24		SW	ORGANICS dark brown, partially decomposed leaves and woody material SAND (SW) gray brown, dry to moist, well graded, fine roots
2	[1]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB33

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475179.81
Easting: 1427134.75

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 54.61 feet ¹
1	LCBSB33-[1]			24/24		GW	CHERT GRAVEL (GW) red brown, loose to moderately dense, dry, sub-angular
2							
3				24/24		SW	SAND (SW) gray brown, loose to moderately dense, dry to moist, well graded, no odor
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND

Boring terminated at 4 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-33

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB34

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03

Coordinates: Northing: 475200.67
Easting: 1427092.15

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 49.35 feet ¹
1	LCBSB34-[0.3]			18/18		SW	SAND (SW) gray brown, very loose to loose, dry, well graded, fine to medium roots
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

PUNE SAND

PRESIDIO ENVIRONMENTAL LOG, R1 289307.GPJ T&R.GDT 12/11/03

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB35

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475222.41
Easting: 1427134.98

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 54.98 feet ¹
1	LCBSB35-			24/24		GW	CHERT GRAVEL (GW) red brown, loose, dry, rounded to angular, well graded, no odor, size up to 1-inch diameter
	[1]						
2							SAND (SW) gray brown, very loose to loose, dry to moist, well graded, fine roots
	[3]					SW	
3				24/24			
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL

DUNE SAND

Boring terminated at 4 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307.GPJ T&R GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB36

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03




Coordinates: Northing: 475245.57
Easting: 1427094.33

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 40.17 feet ¹
1	LCBSB36- [0.3]			24/ 24		SW	SAND (SW) dark gray brown, moist, well graded, fine roots, woody material
2	[1] DUP	 					Duplicate Soil Sample (DUP073103A)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB37

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/24/03

Date finished: 7/24/03

Coordinates: Northing: 475263.98
Easting: 1427134.28

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type: NA

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 47.99 feet ¹
1	LCBSB37-[0.3]			24/24			Grass SAND dark gray brown, very loose, dry, well graded
2	[1]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB38

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/31/03

Date finished: 7/31/03



Coordinates: Northing: 475289.7
Easting: 1427096.15

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 37.69 feet ¹
1	LCBSB38- [0.3]			18/ 18		SW	SAND (SW) black, dense, saturated, well graded, no odor, with organic matter
	[1] [MSD]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

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Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307.GPJ T&R GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB39

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 475309.29



Easting: 1427133.34

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 44.89 feet ¹
1	LCBSB39- [0.3]			18/ 18		SW	SAND (SW) gray brown, very loose, moist, well graded, no odor
	[1] [MSD]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

PUNE SAND

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB40

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/30/03

Date finished: 7/30/03



Coordinates: Northing: 475332.59
Easting: 1427098.64

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 36.77 feet ¹
	LCBSB40- [0.3]					PT	PEAT (PT) black, dense, saturated, moderate odor, highly organic layer
1	[1]			18/ 18		SW	SAND (SW) black, loose, saturated, well graded, no odor
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB41

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: D. Sutherland

Date started: 7/30/03

Date finished: 7/30/03




Coordinates: Northing: 475356.61
Easting: 1427133.16

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 42.20 feet ¹
1	LCBSB41-[0.3]			24/24		SW	SAND (SW) gray brown, very loose, moist, rounded to angular, well graded, no odor
	[1]						
2	DUP						Duplicate Soil Sample (DUP073003C)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCBSB42

PAGE 1 OF 1

Boring location: See Figure 7*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03

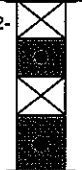
Coordinates: Northing: 475350.92
Easting: 1427150.64

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: NA

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 47.74 feet ¹
1	LCBSB42- [0.3] [1]			18/ 18		SW	SAND (SW) gray brown, very loose, dry
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307 GPJ T&R GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB01

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/28/03

Date finished: 7/28/03



Coordinates: Northing: 474815.37
Easting: 1428460.2

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 88.88 feet ¹
1	LCPSB01- [0.3]			18/ 18		SP	GRAVELLY SAND (SP) gray brown, loose, dry to moist, sub-rounded, poorly graded, <5 percent fines, no odor, gravel up to 1-inch diameter
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB02

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/28/03

Date finished: 7/28/03


Coordinates: Northing: 474846.86
Easting: 1428437.25

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 88.45 feet ¹
1	LCPSB02- [0.3] [1]			18/ 18		SW	SAND (SW) gray brown, dry, well graded, <5 percent fines, no odor, with fine roots
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

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Figure:
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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB03

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/28/03

Date finished: 7/28/03

Coordinates: Northing: 474826.28
Easting: 1428401.27

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 88.21 feet ¹
1	LCPSB03- [0.3]			18/ 18		SP	SAND with GRAVEL (SP) gray brown, poorly graded, fine roots, 15 percent gravel, <5 percent fines
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB04

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/28/03

Date finished: 7/28/03

Coordinates: Northing: 474898.66



Easting: 1428404.46

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 85.77 feet ¹
1	LCPSB04-[0.3]			18/18		SW	SAND (SW) gray brown, very loose, dry, well graded, <5 percent fines, no odor
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

PUNE SAND

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG, R1 289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB05

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/28/03

Date finished: 7/28/03


Coordinates: Northing: 474960.45
Easting: 1428332

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 85.25 feet ¹
1	LCPSB05- [0.3] [1]		18/ 18			SW	SAND (SW) gray brown, very loose to loose, dry, well graded, <5 percent fines <div style="text-align: right;">DUNE SAND</div>
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB06

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Boring location: See Figure 8*

Logged by: R. Richards

Date started: 8/4/03

Date finished: 8/4/03



Coordinates: Northing: 475136.54
Easting: 1428231.07

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 83.41 feet ¹
1	LCPSB06- [0.3]			18/ 18		SW	SAND (SW) gray brown, well graded, <5 percent fines, fine roots at top
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

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Figure:
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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB07

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 8/4/03

Date finished: 8/4/03

Coordinates: Northing: 475205.7
Easting: 1428240.28

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 84.08 feet ¹
1	LCPSB07- [0.3]			18/ 18		SW	SAND (SW) gray brown, loose, dry, <5 percent fines, no odor
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB08

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 8/1/03

Date finished: 8/1/03



Coordinates: Northing: 475162.55
Easting: 1428685.89

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 108.97 feet ¹
1	LCPSB08- DUP [1]			30/ 30		SW	SAND (SW) brown, loose, moist, well graded, <5 percent fines, no odor Duplicate Soil Sample (DUP080103B)
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB09

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 475119.45
Easting: 1428628.55

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 98.32 feet ¹
1	[1]			30/30		SW	SAND (SW) gray brown, very loose to loose, moist, well graded, <5 percent fines, no odor DUNE SAND
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB10

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 475175.09
Easting: 1428639.49

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 106.38 feet ¹
1	LCPSB10-[1]			30/30		SW	SAND (SW) gray brown, very loose to loose, moist, well graded, <5 percent fines, no odor DUNE SAND
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB11

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475229.46
Easting: 1428667.6

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 119.66 feet ¹
	LCPSB11-			6/6			SAND (SW) gray brown, loose to moderately dense, dry to moist, <5 percent fines, no odor, fine to coarse roots and woody material
1	[1]					SW	
2	[2]			24/24			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB12

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03



Coordinates: Northing: 475248.21
Easting: 1428627.48

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 117.14 feet ¹
1	LCPSB12- [1]			6/6		SW	SAND (SW) gray brown, loose to moderately dense, dry, well graded, <5 percent fines, no odor, with fine to coarse roots DUNE SAND
2	[2]			24/ 24			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB13

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475199




Easting: 1428580.59

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 105.76 feet ¹
	LCPSB13-			6/6			SAND (SW) gray brown, loose to moderately dense, dry to moist, well graded, <5 percent fines, no odor, fine roots and woody material
1	[1] [MSD]					SW	
2	[2] [MSD]			24/ 24			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/12/03

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB14

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475153.06
Easting: 1428559.81

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 99.34 feet ¹
1	LCPSB14-						SAND (SW) gray brown, moist, well graded, <5 percent fines, no odor, fine roots at surface Duplicate Soil Sample (DUP080103A)
	[1]					SW	
2	[2]						
3	DUP						
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/11/03

Boring terminated at 3 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB15

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03

Coordinates: Northing: 475182.65
Easting: 1428500.59

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 97.34 feet ¹
1	LCPSB15- DUP (1)			30/ 30		SW	SAND (SW) gray brown, very loose, moist, well graded, <5 percent fines, no odor Duplicate Soil Sample (DUP073103E) DUNE SAND
2	(2)						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-57

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB16

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03



Coordinates: Northing: 475220.58
Easting: 1428520.69

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 103.88 feet ¹
1	LCPSB16- [1]		6/6			SW	SAND (SW) dark brown, very loose to loose, dry to moist, well graded, <5 percent fines, no odor, fine roots from 0 to 1'
2	[2]		24/ 24				medium dense at 1.5 feet
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-58

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB17

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03


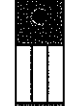
Coordinates: Northing: 475268.7
Easting: 1428568.99

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 110.80 feet ¹
1	LCPSB17-[1]			6/6		SW	SAND (SW) dark brown, loose to moderately dense, dry to moist, well graded, <5 percent fines, no odor, fine roots DUNE SAND
2	[2]			24/24			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB18

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03



Coordinates: Northing: 475344.45
Easting: 1428149.65

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 81.54 feet ¹
1	LCPSB18- [0.3]					SW	SAND (SW) dark brown, dry to moist, well graded, <5 percent fines, no odor, with some fine roots DUNE SAND
2	[1.0]		24/ 24				
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG, R1 289307B.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB19

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03




Coordinates: Northing: 475338.32
Easting: 1428116.94

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 78.67 feet ¹
	LCPSB19- [0.3]					SP	GRAVELLY SAND (SP) gray-brown, dry, rounded to angular, well graded, no odor
1	[1.0]			24/ 24		SW	SAND (SW) gray brown, loose, dry to moist, well graded, <5 percent fines, no odor, trace fine roots
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG-R1 289307B.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB20

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475292.961
Easting: 1428147.82

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 76.39 feet ¹
	LCPSB20-						6-inches Asphalt
1	[1]			24/24		GW	CHERT GRAVEL (GW) red brown, moderately dense, dry, rounded to angular, well graded, no odor
2						SW	SAND (SW) gray brown, dry to moist, well graded, <5 percent fines, no odor, increasing moisture with depth
3	[2.5]			12/12			
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND

Boring terminated at 3 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-62

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB21

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475268.29
Easting: 1428104.14

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 75.72 feet ¹
1	LCPSB21-[1]			24/24		GW	CHERT GRAVEL with CLAY (GW) loose, dry, rounded to angular, well graded, 20 percent fines, no odor, gravel size up to 1/4-inch
2							
3	[2.5]			24/24		SW	SAND (SW) gray brown, loose to moderately dense, <5 percent fines, no odor
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND

Boring terminated at 4 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB22

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/31/03

Date finished: 7/31/03



Coordinates: Northing: 475305.68
Easting: 1428069.99

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 75.58 feet ¹
1	LCPSB22-[1]			36/36		SP	SAND (SP) gray brown, moderately dense, moist, poorly graded, coarse sand, <5 percent fines, no odor
2	[2]					SW	SAND (SW) gray brown, dense, moist to wet, well graded, <5 percent fines, no odor
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND

PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/11/03

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB23

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/31/03

Date finished: 7/31/03




Coordinates: Northing: 475266.84
Easting: 1428032.3

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 74.89 feet ¹
1	LCPSB23- [0.3]					SP	SAND (SP) gray, moist, poorly graded, coarse sand, <5 percent fines, no odor
	[1.0]						
2	DUP		24/ 24			SW	SAND (SW) gray brown, moist, well graded, <5 percent fines, no odor Duplicate Soil Sample (DUP073103D)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND FILL

Boring terminated at 2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB24

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475234.99
Easting: 1428081.04

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 75.04 feet ¹
	LCPSB24-						6-inches Asphalt & Baserock
1	[1]			24/24		GP	GRAVELLY SAND (GP) brown, rounded to angular, up to 1/4-inch
2							
3	[2.5]			24/24		SW	SAND (SW) gray brown, moderately dense, dry to moist, well graded, <5 percent fines, no odor
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND

Boring terminated at 4 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-66

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB25

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475211.959
Easting: 1428047.068

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 73.53 feet ¹
	LCPSB25-						12-inches Asphalt & Baserock
1				24/24			
2	[1]					SW	SAND (SW) gray brown, moderately dense, dry to moist, well graded, <5 percent fines, no odor
3	[2.5]			12/12			
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 3 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB26

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/31/03

Date finished: 7/31/03


Coordinates: Northing: 475241.69
Easting: 1428023.86

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 73.19 feet ¹
1	LCPSB26- [0.3] [1]			18/ 18		SW	SAND (SW) gray brown, loose, dry to moist, well graded, <5 percent fines, no odor, flower bed
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-68

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB27

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03


Coordinates: Northing: 475374.33
Easting: 1428023.68

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 73.88 feet ¹
	LCPSB27-						2-inches Gravel & Baserock SAND (SW) gray brown, loose to moderately dense, dry to moist, well graded, <5 percent fines, no odor
1	[1]					SW	
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-69

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB28

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03





Coordinates: Northing: 475411.3
Easting: 1427972.44

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 73.66 feet ¹
1	LCPSB28-			6/6			SAND (SW) dark brown, moderately dense, moist, well graded, <5 percent fines, no odor, trace fine roots, base rock at surface
	(1)					SW	
2				24/24			
	(2)						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure: B-70

PRESIDIO ENVIRONMENTAL LOG, R1 289307B.GPJ T&R.GDT 12/11/03

PROJECT: SMALL ARMS FIRING RANGES Presidio of San Francisco, California						Log of Boring LCPSB29 PAGE 1 OF 1	
Boring location: See Figure 8*						Logged by: D. Sutherland	
Date started: 7/23/03				Date finished: 7/23/03		Coordinates: Northing: 475460.77 Easting: 1428024.78	
Drilling method: Direct Push							
Hammer weight/drop: NA				Hammer type:			
Sampler: Split Spoon							
DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			Ground Surface Elevation: 82.53 feet ¹
1	LCPSB29-[1]	X		6/6		SW	SAND (SW) gray brown, very loose, dry, well graded, <5 percent fines, no odor, fine roots and woody material <div style="display: flex; align-items: center; justify-content: center;"> <div style="width: 100%; height: 100%; border: 1px solid black; position: relative;"> <div style="position: absolute; right: -10px; top: 0; bottom: 0; transform: rotate(90deg);">DUNE SAND</div> </div> </div>
2	[2]	X		24/24			
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
 Boring backfilled with soil cuttings.
 Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
 * Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07 Figure: B-71

PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB30

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475506.65
Easting: 1428024.37

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
	LCPSB30-			6/6			Ground Surface Elevation: 85.51 feet ¹
1	[1]			24/24		SW	SAND (SW) gray brown, very loose, dry, well graded, <5 percent fines, no odor, with fine roots and woody material DUNE SAND
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-72

PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/11/03

PROJECT: SMALL ARMS FIRING RANGES Presidio of San Francisco, California						Log of Boring LCPSB31 PAGE 1 OF 1	
Boring location: See Figure 8*						Logged by: R. Richards	
Date started: 8/4/03				Date finished: 8/4/03		Coordinates: Northing: 475561.58 Easting: 1428003.93	
Drilling method: Direct Push							
Hammer weight/drop: NA				Hammer type:			
Sampler: Split Spoon							
DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
Ground Surface Elevation: 106.93 feet ¹							
1	LCPSB31-[1]		6/6	24/24	SW	SAND (SW) gray brown, very loose, well graded, <5 percent fines, no odor, with fine roots near surface <div style="text-align: right; margin-top: -40px;"> ↑ DUNE SAND ↓ </div>	
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
 Boring backfilled with soil cuttings.
 Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
 * Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07 Figure: B-73

PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB32

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475500.03
Easting: 1427976.08

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
	LCPSB32-			6/6			Ground Surface Elevation: 81.60 feet ¹
1	[1]			24/24		SW	DUNE SAND
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB33

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 8/4/03

Date finished: 8/4/03

Coordinates: Northing: 475524.07
Easting: 1427938.97

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 86.47 feet ¹
1	LCPSB33-						SAND (SW) gray brown, very loose to loose, dry, well graded, <5 percent fines, no odor Duplicate Soil Sample (DUP080403A)
2	[1]					SW	
	[2]						
3	DUP						
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 3 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure: B-75

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB34

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03



Coordinates: Northing: 475513.76
Easting: 1427902.81

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 84.12 feet ¹
1	LCPSB34-			6/6			SAND (SW) gray brown, loose, dry, well graded, fine roots and pieces of wood
	[1]					SW	
2	DUP			24/24			Duplicate Soil Sample (DUP072303A)
	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure: B-76

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB35

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: D. Sutherland

Date started: 7/23/03

Date finished: 7/23/03




Coordinates: Northing: 475493.87
Easting: 1427929.99

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 81.07 feet ¹
1	LCPSB35-			6/6			SAND (SW) gray brown, very loose, dry, well graded, <5 percent fines, no odor, fine roots, trace woody material DUNE SAND
	[1]					SW	
2				24/24			
	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-77

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB36

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03


Coordinates: Northing: 475445.86
Easting: 1427906.66

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 73.47 feet ¹
	LCPSB36-			6/6			2-inches dark brown Mulch
1	(1)					SW	SAND (SW)
2	(2)			24/24			gray brown, loose, dry to moist, well graded, <5 percent fines, no odor, fine roots and trace woody material
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring LCPSB37

PAGE 1 OF 1

Boring location: See Figure 8*

Logged by: R. Richards

Date started: 7/23/03

Date finished: 7/23/03

Coordinates: Northing: 475411.518
Easting: 1427885.897

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
	LCPSB37-			6/6			Ground Surface Elevation: 73.28 feet ¹
1	[1]						6-inches Baserock Gravel
2	DUP			24/24		SW	SAND (SW) dark brown to gray brown, moderately dense, dry to moist, well graded, <5 percent fines, no odor, with some subrounded rocks up to 1/2-inch
	[2]						Duplicate Soil Sample (DUP072303B)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

FILL
DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-79

PRESIDIO ENVIRONMENTAL LOG R1 289307B.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB02

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480174.78
Easting: 1433609

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 16.44 feet ¹
	MGBSB02-						Organic matter, vegetation
1	[1]			30/30		SM	SILTY SAND (SM) brown, loose, well graded, no odor, trace fine gravel
2	[2]					SM	SILTY SAND with CLAY (SM) red brown, moderately dense to dense, moist, no odor, compacted
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-80

PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB03

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: R. Richards

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480173.43
Easting: 1433596.48

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 18.42 feet ¹
	MGBSB03-						dark brown vegetation layer, roots and leaves
1	[1]			30/30		SM	SILTY SAND (SM) dark brown, moderately dense, dry, 30 percent fines, no odor, fine to medium roots
2	[2]						SILTY SAND (SM) red brown, dense, moist, 30 percent fines, no odor, fine roots, very compacted
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA SAND

PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/11/03

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB04

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland/
R. Richards

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480174.73
Easting: 1433572.22

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 20.56 feet ¹
	MGBSB04-						dead leaves, organic matter
1	[1]			30/30		SM	SILTY SAND (SM) brown grading to dark brown, moderately dense, moist, 40 percent fines, no odor, fine to medium roots to depth
2	DUP [2]						Duplicate Soil Sample (DUP072203A)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-82

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB05

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480186.78
Easting: 1433545.69

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 21.38 feet ¹
	MGBSB05-						Blackberry branches at varying degrees of decomposition, dead leaves
1	[1]			30/30			
2	[2]					SM	SILTY SAND (SM) dark brown, moderately dense, moist, 20 percent fines, no odor, with fine sized roots, trace coarse rock
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA SAND

PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/11/03

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB06

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: R. Richards

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480205.29
Easting: 1433523.37

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 18.18 feet ¹
	MGBSB06-						dark brown vegetation layer, leaves and roots
1	[1]		30/30			SM	SILTY SAND (SM) dark brown, loose, dry, moderately graded, 20 percent fines, no odor
2	[2]						serpentine gravel (fine angular) black at 2.5 feet
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB07

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480187.61
Easting: 1433515.34

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 31.40 feet ¹
	MGBSB07-						vegetation, organic matter
1	[1]			30/30		SP	SAND (SP) dark brown, very loose, dry, <5 percent fines, no odor
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-85

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB08

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480164.53
Easting: 1433502.23

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 53.38 feet ¹
	MGBSB08-						Organic matter, ivy, dead vegetation
1	[1]			30/30		SP	SAND (SP) dark brown, very loose, dry, poorly graded, <5 percent fines, no odor
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-86

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB09

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: R. Richards

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480172.75
Easting: 1433531.57

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 34.49 feet ¹
	MGBSB09-						Organic matters, vegetation
1	[1]		30/30			SP	SAND (SP) dark brown, very loose, dry, poorly graded, <5 percent fines, no odor
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB10

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/22/03

Date finished: 7/22/03

Coordinates: Northing: 480157.26
Easting: 1433618.89

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 20.01 feet ¹
	MGBSB10-						Organic matter, vegetation, ivy
1	(1)		30/30			SP	SAND (SP) brown, very loose, dry, poorly graded, <5 percent fines, no odor
2	(2)						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB11

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/21/03

Date finished: 7/21/03

Coordinates: Northing: 480130.14
Easting: 1433534.85

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 52.30 feet ¹
	MGBSB11-						Organic matter, vegetation
1	[1]		30/30			SC	SANDY CLAY (SC) yellow brown, medium stiff, dry to moist, moderately graded, no odor, with fine serpentinite gravels
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB12

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/21/03

Date finished: 7/21/03

Coordinates: Northing: 480152.1
Easting: 1433542.75

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 37.17 feet ¹
	MGBSB12-						Organic matter, vegetation
1	[1]		30/30			SP	SAND (SP) dark brown, loose, moist, moderately graded, no odor, with fine roots
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNED SAND

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB13

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/21/03

Date finished: 7/21/03

Coordinates: Northing: 480149.11
Easting: 1433562.04

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 30.42 feet ¹
	MGBSB13-						Leaves, roots, vegetation
1	[1]			24/24		SM	SAND (SM) brown, loose, dry, no odor
2							serpentine gravel up to 1/2 inch at 1.5 feet
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA SAND

Boring terminated at 1.7 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB14

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Boring location: See Figure 9*

Logged by: D. Sutherland/
R. Richards

Date started: 7/21/03

Date finished: 7/21/03




Coordinates: Northing: 480124.89
Easting: 1433562.23

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 41.42 feet ¹
	MGBSB14-						leave roots
1	[0.5]		18/	18		SM	SILTY SAND (SM) with SERPENTINITE gravel dark brown, loose, dry, other gravel up to 5-inch
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Refusal at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB15

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/21/03

Date finished: 7/21/03


Coordinates: Northing: 480145.82
Easting: 1433582.94

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 29.77 feet ¹
1	MGBSB15- [1]			18/ 18		SM	Leaves, roots SILTY SAND (SM) dark brown, dry, moderately graded, 30 percent fines, no odor
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA SAND

Refusal at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307D.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB16

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: R. Richards

Date started: 7/21/03

Date finished: 7/21/03

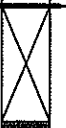

Coordinates: Northing: 480120.06
Easting: 1433588.8

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 39.17 feet ¹
1	MGBSB16- [1]						COLMA SAND
2	[2]		30/ 30			SM	
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

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Figure:

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PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB17

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by:

Date started: 7/21/03

Date finished: 7/21/03

Coordinates: Northing: 480142.14
Easting: 1433603.05

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 29.80 feet ¹
	MGBSB17-						Leaves, vegetation
1	[1]		30/30			SM	SILTY SAND (SM) dark brown, loose, 30 percent fines, no odor, some roots
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA SAND

PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/1/03

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB18

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Boring location: See Figure 9*

Logged by: D. Sutherland

Date started: 7/21/03

Date finished: 7/21/03

Coordinates: Northing: 480122.24
Easting: 1433616.11

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 38.99 feet ¹
1	MGBSB18-[1]			30/30		SP	SAND (SP) yellow brown, very loose, moist, moderately graded, <5 percent fines, no odor DUNE SAND
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

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Figure:

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PRESIDIO ENVIRONMENTAL LOG_R1_289307D.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring MGBSB19

PAGE 1 OF 1

Boring location: See Figure 9*

Logged by: D. Sutherland/
R. Richards

Date started: 7/21/03

Date finished: 7/21/03


Coordinates: Northing: 480137.68
Easting: 1433631.47

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
	MGBSB19- [0.3]					SM	Ground Surface Elevation: 32.01 feet ¹ SILTY SAND (SM) dark brown, loose, dry, moderately graded, no odor, with roots and vegetation
1							tree roots/ bedrock
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

PRESIDIO ENVIRONMENTAL LOG R1 289307D.GPJ T&R.GDT 12/11/03

Refusal at 1.0 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure:

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PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB01

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 482520.63
Easting: 1429736.27

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 134.05 feet ¹
1	CHPSB01-[0.3]						SANDY GRAVEL baserock fill SILTY SAND (SM) dark brown, loose to moderately dense, moist, well graded, 20 percent fines, no odor
	[1]						
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

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Figure:

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PRESIDIO ENVIRONMENTAL LOG, R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB02

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 482508.82
Easting: 1429726.6

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 137.00 feet ¹
1	CHPSB02-[0.3]	X					SILTY SAND (SM) dark brown, loose to moderately dense, dry to moist, 20 percent fines, no odor, with subangular to angular rocks up to 1-inch thick
	[1]	X					
2	[2] [MSD]	X					
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

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Figure: B-99

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB03

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: D. Sutherland

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 482502.8
Easting: 1429735.83

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 134.49 feet ¹
1	CHPSB03-[0.3]	X				SM	SILTY SAND (SM) dark brown, moderately dense to dense, dry to moist, non-plastic, moderately graded, no odor
2	[1]	X					
3	[2]	X				SC	CLAYEY SAND (SC) yellow brown, dense, moist, non-plastic, moderately graded, no odor
3	DUP						Duplicate Soil Sample (DUP073003B)
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

Boring terminated at 3.0 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-100

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB04

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482473.78
Easting: 1429944.8

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
				10/10		SM	Ground Surface Elevation: 138.15 feet ¹ SILTY SAND (SM) dark brown, loose, dry, well graded, 15 percent fines, no odor, fine roots
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Refusal at 10 inches below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-101

PRESIDIO ENVIRONMENTAL LOG, R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB05

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03


Coordinates: Northing: 482471.07
Easting: 1429911.85

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 123.29 feet ¹
1	CHPSB05-[1]			24/24		SM	SILTY SAND (SM) dark brown, very loose to loose, dry, well graded, 15 percent fines, no odor, fine roots, trace woody material, trace rocks up to 1/2-inch diameter
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

Refusal at 2.0 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-102

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB06

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Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482460.39
Easting: 1429904.09

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 122.99 feet ¹
1	CHPSB06-[1]						SILTY SAND (SM) dark brown, very loose to loose, dry to moist, well graded, no odor, fine roots in top 6-inch, trace woody material to depth
2	[2]						
3	[3]						
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-103

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB07

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482441.03
Easting: 1429898.74

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 123.54 feet ¹
1	CHPSB07-[1]						SILTY SAND with GRAVEL (SW) dark brown, loose, sub-angular, 15 percent fines, no odor
2	[2]			42/42		SW	
3	DUP [3]						
4							Duplicate Soil Sample (DUP072903A)
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-104

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB08

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03



Coordinates: Northing: 482424.47
Easting: 1429898.84

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 127.74 feet ¹
1	CHPSB08-[1]			30/30		SM	COLMA
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Refusal at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-105

PRESIDIO ENVIRONMENTAL LOG_R1_289307E.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB09

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482448.8
Easting: 1429939.96

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 141.57 feet ¹
1	CHPSB09-						SILTY SAND with CLAY gray brown, loose, moist, no odor
2	DUP						Duplicate Soil Sample (DUP072903D)
3	[2]						
4	[3]						
5	[4]						
6							
7							
8							
9							
10							
11							
12							

54/
54

SW

DUNE SAND

Boring terminated at 4.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure: B-106

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB10

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482424
Easting: 1429932.21

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 140.89 feet ¹
1	CHPSB10-					SM	SILTY SAND (SM) dark brown, loose, dry to moist, well graded, with fine roots, no odor
2	[2]			54/54			SAND (SW) brown, loose, dry to moist, well graded, no odor
3	DUP					SW	Duplicate Soil Sample (DUP072903A)
4	[3]						
4	[4]						
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 4.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-107

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB11

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 482418.78
Easting: 1429859.33

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 123.07 feet ¹
1	CHPSB11- DUP [1]						SILTY SAND (SM) dark brown, very loose, moist, moderately graded, 20 percent fines, no odor Duplicate Soil Sample (DUP073003A) <div>COLMA?</div>
2	[2]			42/ 42		SM	
3	[3] (MSD)						
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.:
2893.07

Figure:
B-108

PRESIDIO ENVIRONMENTAL LOG, R1, 289307E.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB12

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03




Coordinates: Northing: 482404.84
Easting: 1429822.3

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 128.87 feet ¹
1	CHPSB12- [1]						SILTY SAND (SM) dark brown, loose, moist, well graded, 20 percent fines, no odor, with fine roots
2	[2]			42/ 42		SM	
3	[3]						
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA ?

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-109

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB13

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 482396.39
Easting: 1429871.39

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 132.10 feet ¹
1	CHPSB13-[1]					SM	SILTY SAND (SM) dark brown, very loose, moist, well graded, 15 percent fines, no odor, with fine roots
2	[2]		42/42			SC	CLAYEY SAND (SC) yellow brown, moderately dense, moist, well graded, 20 percent fines, no odor
3	[3]						
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-110

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB14

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482403.38
Easting: 1429894.26

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 130.01 feet ¹
1	CHPSB14-[1]	X					SILTY SAND (SM) dark brown, very loose, dry to moist, moderately graded, 20 percent fines, no odor, trace fine roots and red bricks
2	[2]	X		42/42		SM	
3	[3]	X					
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA?

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-111

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB15

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03




Coordinates: Northing: 482380.77
Easting: 1429892.83

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 137.47 feet ¹
1	CHPSB15-[1]					SM	SILTY SAND (SM) dark brown, very loose, dry, 40 percent fines, no odor
2	[2]		42/42				
3	[3]					SC	CLAYEY SAND (SC) yellow brown, moderately dense, moist, 40 percent fines, no odor, with brick fragments
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-112

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB16

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03




Coordinates: Northing: 482376.89
Easting: 1429911.93

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 136.45 feet ¹
1	CHPSB16- [0.3]						SILTY SAND (SM) dark brown, loose, dry, well graded, 15 percent fines, no odor, with fine roots in top 2-inches
2	[1]						
2	DUP [2]			30/ 30		SM	Duplicate Soil Sample (DUP072903C)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA?

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-113

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB17

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482399.96
Easting: 1429920.06

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 140.44 feet ¹
1	CHPSB17-						SILTY SAND (SM) dark brown, loose, dry to moist, well graded, 15 percent fines, no odor, with fine roots in top 2-inches
2	[2]					SM	
3	[3]						yellow brown clayey sand clods at 3.5 feet
4							
5							
6							
7							
8							
9							
10							
11							
12							

Refusal at 4 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-114

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB18

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482426.99
Easting: 1429948.41

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 136.81 feet ¹
1	CHPSB18- [0.3]						SILTY SAND (SM) dark brown, loose, dry, well graded, 15 percent fines, no odor, fine roots in top 2-inches COLMA
	[1]						
2	[2]						
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-115

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB19

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/29/03

Date finished: 7/29/03

Coordinates: Northing: 482482.5
Easting: 1429925.63

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 127.24 feet ¹
1	CHPSB19-						SAND (SW) dark brown, very loose to moderately dense, dry to moist, well graded, 5 percent fines, no odor
2	[2]			54/54		SW	red brick fragment between 2.5 to 3 feet, color lightens at 2.5 feet, increasing density with depth
3	[3]						
4	[4]						
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 4.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-116

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB20

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 482489.24
Easting: 1429906.5

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 121.03 feet ¹
1	CHPSB20-[1]					SM	SILTY SAND (SM) dark brown, very loose, moist, moderately graded, no odor
2	[2]			42/42		SC	CLAYEY SAND (SC) yellow brown, moderately dense, moist, with trace rocks plus wood chips
3	[3]					SP	SAND (SP) dark brown, moderately dense, moist, poorly graded, no odor
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-117

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB21

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 482476.4
Easting: 1429771.56

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 125.25 feet ¹
1	CHPSB21-[0.3]			24/24		SM	Asphalt and sandy gravel, no odor SILTY SAND (SM) dark brown, dense, moist, no odor
2	[1]			24/24			
3	[2.5]			24/24		SC	CLAYEY SAND (SC) yellow brown, dense to very dense, moist, 40 percent fines, no odor
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA?

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-118

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB22

PAGE 1 OF 1

Boring location: See Figure 10*

Date started: 7/25/03

Date finished: 7/25/03

Logged by: D. Sutherland/
R. Richards

Coordinates: Northing: 482505.05
Easting: 1429782.06

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 124.69 feet ¹
	CHPSB22-						3-inches Asphalt Baserock.
1	[0.3]						SILTY SAND (SM) dark brown, loose, moist, well graded, 30 percent fines, no odor
	[1]			24/24			
2						SM	
3	[2.5]			18/24			SANDY CLAY (CL) yellow brown, medium stiff, moist, plastic, 35 percent sand, no odor, with roots
4						CL	
5							
6							
7							
8							
9							
10							
11							
12							

COLMA?

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-119

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB23

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: D. Sutherland/
R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 482492.11
Easting: 1429824.33

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 122.60 feet ¹
	CHPSB23-						3-inches Asphalt Baserock
	[0.3]						SILTY SAND (SM) dark brown, loose, moist, well graded, no odor
1	[1]			24/ 24			
2						SM	Bullet casing found between 0 to 1 feet
3	[2.5]			18/ 24			
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-120

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB24

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 482463.45
Easting: 1429814.04

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 123.01 feet ¹
	CHPSB24-						4-inches Asphalt Baserock, trace brick fragments
	[0.3]						SILTY SAND (SM)
1				24/			dark brown, loose, moist, well graded, no odor
	[1]			24			
2						SM	
3	[2.5]			18/			
				24			
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure: B-121

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB25

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 482448.49
Easting: 1429859.5

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 122.06 feet ¹
	CHPSB25-					GP	SANDY GRAVEL (GP) gray, dense, asphalt and baserock
1	DUP			24/24			SILTY SAND (SM) dark brown, loose, moist, 20 percent fines, no odor
	[1]						Duplicate Soil Sample (DUP072503A)
2	[2]					SM	
3	[3]			24/24			
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA?

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure: B-122

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB26

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Drilling method: Direct Push

Coordinates: Northing: 482477.58
Easting: 1429870.1

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 121.94 feet ¹
1	CHPSB26-[1]			24/24		GP	SANDY GRAVEL (GP) gray, dense, asphalt and baserock
2						SM	SILTY SAND (SM) dark brown, loose, moist, moderately graded, no odor
3	[3]			12/24			
4	[3.5]					SC	CLAYEY SAND (SC) yellow brown, dense, moist, moderately graded, 40 percent fines, no odor
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-123

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring CHPSB27

PAGE 1 OF 1

Boring location: See Figure 10*

Logged by: R. Richards

Date started: 7/30/03

Date finished: 7/30/03

Coordinates: Northing: 482496.32
Easting: 1429873.74

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Hand Auger

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 118.96 feet ¹
1	CHPSB27-[1]	X				SM	SILTY SAND (SM) dark brown, loose, dry, well graded, trace roots, 15 percent fines, no odor
2	[2] [MSD]	X		42/42		SC	CLAYEY SAND (SC) yellow brown, moist, trace roots, 20 percent fines, no odor
3	[3]	X				SM	SILTY SAND (SM) dark brown, loose to moderately dense, moist, 15 percent fines, no odor
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA?

PRESIDIO ENVIRONMENTAL LOG R1 289307E.GPJ T&R GDT 12/11/03

Boring terminated at 3.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure: B-124

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB01

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 478051.9
Easting: 1434945.15

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 58.14 feet ¹
1	BAPSB01-[1]		24/24			GW	SANDY GRAVEL with CLAY (GW) gray brown, dense, dry, sub-rounded to sub-angular, moderately graded, no odor, 15 percent fines, brick fragments
2							
3							
4	[3.5]		24/24				
5	[4.5] [MSD]					SM	SILTY SAND (SM) dark brown, very dense, moist, well graded, no odor
6	[5.5]		24/24				
7							
8							
9							
10							
11							
12							

Boring terminated at 6 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell&Rollo

Project No.: 2893.07

Figure: B-125

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB02

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: D. Sutherland

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 478027.313
Easting: 1434977.793

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 57.761 feet ¹
	BAPSB02-					GW	7-inch Asphalt and Baserock
1	[1]			24/24		SC	CLAYEY SAND (SC) yellow brown, dry, well graded, no odor
2						GW	CHERT GRAVEL with SAND (GW) red brown, dry, well graded
3	[3]			24/24		SM	SILTY SAND (SM) dark brown, dense, dry, no odor, red streaks between soil aggregates
4	DUP					SM	Duplicate Soil Sample (DUP072503B)
5				24/24		ML	SANDY SILT (ML) black, soft, moist, non-plastic, well graded, no odor
6	[5.5]						
7							
8							
9							
10							
11							
12							

Boring terminated at 6 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-126

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB03

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/28/03

Date finished: 7/28/03

Coordinates: Northing: 477998.11
Easting: 1435029.82

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 58.23 feet ¹
1	BAPSB03- [0.3]			18/ 18		SM	SILTY SAND (SM) yellow brown, fill in flower bed
	[1]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-127

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB03R

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: D. Sutherland

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 478017.19
Easting: 1435042.061

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 55.441 feet ¹
1	BAPSB03R			24/24			SANDY SILT (SM) olive brown, dense, non-plastic, moderately graded, no odor, with brick fragments
2				12/24		SM	
3							
4							CHERT with SILT (GM) red brown, loose, rounded to sub-rounded, moderately graded, no odor
5				6/24		GM	
6	[5.5]					SW	SAND (SW) gray brown, moist, rounded to angular, moderately graded, no odor
6.5	[6]						
7	[6.5]			24/24			SAND with SILT (ML) black, medium stiff, moist
8						ML	
9				18/18			
10							
11							
12							

Boring terminated at 9.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-128

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB04

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: D. Sutherland

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 477940.673
Easting: 1434984.221

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 59.41 feet ¹
1	BAPSB04-						SILTY SAND (SM) brown to gray brown, moderately dense, 30 percent fines, fine roots to entire depth Duplicate Soil Sample (DUP080103D)
	[1] (MDS)			24/24			
2	DUP					SM	
3				12/24			
	[3]						
4							
5							
6							
7							
8							
9							
10							
11							
12							

COLMA

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/12/03

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-129

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB05

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 477988.023
Easting: 1434949.5

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon/ Envirocore

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 60.079 feet ¹
1	BAPSB05- [0.3]			12/ 12		GW	SANDY GRAVEL (GW) brown, dense to very dense, dry, rounded to angular, well graded, no odor, gravel up to 1/4-inch
2	[1]					GW	CHERT GRAVEL (GW) red brown, dense to very dense, dry, rounded to angular, well graded, no odor, gravel up to 1-inch
3	[3]			48/ 48		SC	CLAYEY SAND (SC) dark brown, dense, moist, well graded, no odor, 40 percent fines
4	[3.5]					SC	CLAYEY SAND (SC) yellow brown, very dense, moist, well graded, no odor, with trace fine gravel
5						SC	
7	[7] (MSD)			48/ 48		ML	SILT with SAND (ML) black, soft, moist, slightly plastic, no odor
8	DUP					ML	Duplicate Soil Sample (DUP080103F)
9	[8.5]						
10							
11							
12							

Boring terminated at 9 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-130

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB06

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 478012.51
Easting: 1434908.61

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 60.41 feet ¹
1	BAPSB06-[1]		24/24				SANDY GRAVEL (GW) brown, sub-angular, 20 percent fines, some chert gravel at random depths
2			12/24			GW	
3	[3]						
4			24/24				
5							
6	[5.5]					SM	SILTY SAND (SM) dark brown, dense, dry, no odor
7							
8							
9							
10							
11							
12							

FILL

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/11/03

Boring terminated at 6 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-131

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB07

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 477985.49
Easting: 1434870.57

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 61.63 feet ¹
1	BAPSB07-			24/24		GM	SANDY GRAVEL (GM) dark brown and olive brown, moderately dense, dry, sub-angular, some chert gravel, trace brick fragments
2							
3				24/24		SC	CLAYEY SAND with GRAVEL (SC) yellow brown, very dense, dry, sub-angular, trace chert gravel
4							
5				24/24		SW	SILTY SAND with GRAVEL (SW) dark brown, dense, dry, sub-angular
6	[5.5]						
7				12/24		SW	SAND (SW) gray brown, moist, well graded
8				0/6			
9							
10							
11							
12							

Refusal at 8.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-132

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB08

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: D. Sutherland

Date started: 7/28/03

Date finished: 7/28/03


Coordinates: Northing: 477944.48
Easting: 1434929.3

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type: Slide Hammer

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
	BAPSB08- [0.3]			6/6		SM	Ground Surface Elevation: 62.21 feet ¹ SILTY SAND with GRAVEL (SM) loose, dry to moist, no odor, with 1/4-inch angular gravel
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Refusal at 6 inches below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-133

TEST ENVIRONMENTAL 289307C.GPJ T&R.GDT 12/12/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB08R

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 477937.593
Easting: 1434936.407

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Envirocore

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 61.424 feet ¹
1	BAPSB08R			12/12			SANDY GRAVEL with CLAY (GM) yellow brown, moderately dense
2						GM	dark brown silty sand clods at various depths
3				48/48			
4							
5						SW	SILTY SAND (SW) dark brown, moderately dense, moist, 40 percent fines, brick fragments
6				48/48			
7	[6.5]						SILTY SAND (SM) dark brown, moderately dense, moist, well graded
8	[7.5]					SM	
9							
10							
11							
12							

FILL

Boring terminated at 9 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-134

PRESIDIO ENVIRONMENTAL LOG R: 289307C.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB09

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 477922.53
Easting: 1434972.3

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 62.09 feet ¹
1	BAPSB09-[0.3]	[0.3]				SW	MULCH dark brown, loose, dry, grass and twigs
	[1]	[1]		24/24			SAND (SW) gray brown, dense, dry, well graded, very fine roots
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Figure: B-135

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB10

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 477874.391
Easting: 1434950.151

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 73.996 feet ¹
1	BAPSB10-	•					SAND (SW) gray brown, loose to moderately dense, dry, well graded, less than 10 percent fines
	[1] [MSD]	■		12/24			
2		■				SW	
	[2]	■					
3				24/24			
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-136

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB11

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 8/1/03

Coordinates: Northing: 477908.32
Easting: 1434896.63

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 70.44 feet ¹
1	BAPSB11-[1]		24/24			GP	SANDY GRAVEL (GP) gray, moderately dense, dry, poorly graded
2	[2]					CL	CLAY with GRAY SANDY CLAY (CL) yellow brown, very stiff, dry red brick fragments at 2 feet
3	[3]		24/24			SM	SILTY SAND (SM) dark brown, loose, moist, well graded
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-137

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB12

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: D. Sutherland

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 477942.855

Easting: 1434864.342

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 62.26 feet ¹
1	BAPSB12- [1]			24/ 24		SM	SILTY SAND (SM) gray brown, moderately dense, dry, well graded
2	DUP						
3	[3]			24/ 24		SW	SAND (SW) brown, loose to moderately dense, moist, well graded, no odor Duplicate Soil Sample (DUP080103C)
4							
5							
6							
7							
8							
9							
10							
11							
12							

DUNE SAND

Boring terminated at 4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-138

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB13

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/28/03

Date finished: 7/28/03


Coordinates: Northing: 477887.77
Easting: 1434812.07

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 65.13 feet ¹
1	BAPSB13- [0.3] [1]			18/ 18		SM	SILTY SAND (SM) dark brown, loose, dry, well graded, no odor, 30 percent fines
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-139

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB14

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: D. Sutherland

Date started: 7/28/03

Date finished: 7/28/03



Coordinates: Northing: 477857.38
Easting: 1434859.74

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 68.00 feet ¹
1	BAPSB14- [0.3]			18/ 18		SM	SILTY SAND (SM) dark brown, loose, moist, moderately graded, no odor, fine roots
	[1] [MSD]						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.:
2893.07

Figure:
B-140

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB15

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/25/03

Date finished: 7/25/03

Coordinates: Northing: 477832.39
Easting: 1434902.83

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 78.50 feet ¹
	BAPSB15-						Organic Layer
	[0.3]						dark brown, twigs, grass, wood
1						SW	SAND (SW)
	[1]			24/ 24			gray brown, loose, 5 percent fines, no odor
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation
Report (Treadwell & Rollo, 2004).

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Figure: B-141

PRESIDIO ENVIRONMENTAL LOG R1 289307C.GPJ T&R.GDT 12/11/03

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB16

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 8/1/03

Date finished: 8/1/03

Coordinates: Northing: 477788.38
Easting: 1434857.24

Drilling method: Direct Push

Hammer weight/drop: NA

Hammer type:

Sampler: Split Spoon

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 81.89 feet ¹
1	BAPSB16- [0.3]			24/ 24		SW	SAND (SW) brown to gray brown, loose to moderately dense, dry, well graded, less than 5 percent fines, fine roots
2	DUP						Duplicate Soil Sample (DUP080103E)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-142

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB17

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: D. Sutherland

Date started: 7/28/03

Date finished: 7/28/03




Coordinates: Northing: 477810.65
Easting: 1434818.19

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 68.90 feet ¹
1	BAPSB17- [0.3] [MSD]						Organic Layer dark brown, partially decomposed twigs, grass and wood
	[1]			24/ 24		SM	SILTY SAND (SM) dark brown, dry, well graded, with fine roots
2	DUP						Duplicate Soil Sample (DUP072803A)
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 2 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

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Project No.: 2893.07

Figure: B-143

PROJECT: **SMALL ARMS FIRING RANGES**
Presidio of San Francisco, California

Log of Boring BAPSB18

PAGE 1 OF 1

Boring location: See Figure 11*

Logged by: R. Richards

Date started: 7/28/03

Date finished: 7/28/03


Coordinates: Northing: 477839.75
Easting: 1434780.83

Drilling method: Hand Auger

Hammer weight/drop: NA

Hammer type:

Sampler: Slide Hammer

DEPTH (feet)	SAMPLES				OVM (ppm)	LITHOLOGY	MATERIAL DESCRIPTION
	Sample Number	Sample	Blow Count	Recovery (inches)			
							Ground Surface Elevation: 66.80 feet ¹
1	BAPSB18- [0.3] [1]		18/ 18			SM	SILTY SAND (SM) dark brown, loose, dry, 30 percent fines
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							

Boring terminated at 1.5 feet below ground surface.
Boring backfilled with soil cuttings.
Groundwater not encountered during drilling.

¹ Presidio Lower Low Water Datum.
* Draft Small Arms Firing Ranges Remedial Investigation Report (Treadwell & Rollo, 2004).

Treadwell & Rollo

Project No.: 2893.07

Figure: B-144

PRESIDIO ENVIRONMENTAL LOG, R1 289307C.GPJ T&R.GDT 12/11/03